

**PINEDALE ANTICLINE  
SUPPLEMENTAL  
ENVIRONMENTAL IMPACT  
STATEMENT  
2008 RECORD OF DECISION  
WORKSHOP**

**SATURDAY AUGUST 6, 2011**



# Purpose of the Meeting

- Overview of the 2008 Pinedale Anticline SEIS ROD.
- Enhance understanding of the intent of the document, the reasons behind the decision, and where various decisions and commitments can be found.
- Discuss progress in implementation to date.



# Agenda

- 9:00 Reasons for the SEIS and Decision  
(BACKGROUND)
- 9:20 Decision
- 10:00 Implementation
- 10:30 PAPO
- 10:40 Development Process
- 11:40 Clarification Opportunity for Public
- 11:55 Break



# Agenda

## Focus Area Discussions

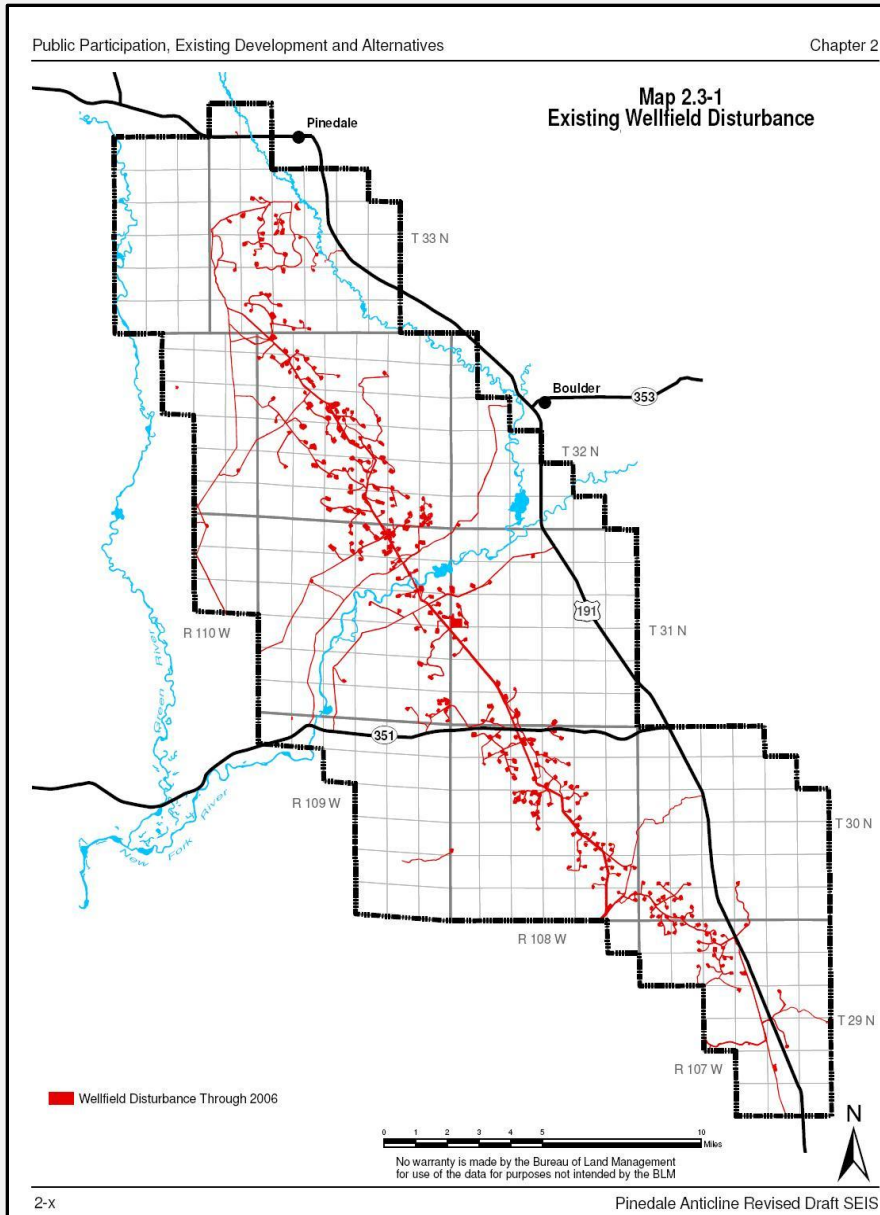
- 12:05 Wildlife Monitoring and Mitigation Matrix
- 12:25 Air
- 12:45 Water
- 1:05 Public Involvement
- 1:10 Clarification Opportunity for Public



Shane DeForest, Field Manager  
Pinedale Field Office  
Bureau of Land Management



# Pinedale Anticline Project Area



Area:  $\approx$  198,000 acres  
South of Pinedale, WY  
(8.5X the size of the Jonah Infill)

Land ownership:  
80% federal  
5% state  
10% private  
5% mixed ownership

One of the Nation's  
Largest Natural Gas  
Fields  $\sim$ 25 TCF of  
Recoverable Natural  
Gas



# Background: PAPA 2000 ROD

## Preferred Alternative

- 700 producing well pads on a combination of Federal/state/private surface state. Analysis assumed an additional 200 dry holes
- 40 acre downhole well spacing (16 wells per section)
- 9 Management Areas based on resource concerns
- Seasonal restrictions in place (case by case exceptions)
- Production facilities on individual pads
- Four compressor stations with an analysis rate of 26,000 hp
- Up to 276 miles of access roads and gathering pipelines; 121 miles of sales pipelines
- Adaptive Management and establishment of the PAWG
- NOx analysis threshold set at 693.5 tons per year (EIS scope of analysis) combination of construction/drilling, well production and compression
- Resource specific monitoring plans



# Background

Pinedale Anticline Working Group: Chartered By The Secretary Of the Interior AUGUST 2004 following litigation by Yates Petroleum challenging the need for a FACA charter.

Finding of No Significant Impact, Decision Record For The Questar Year-Round Drilling Proposal, Sublette County, Wyoming (NOV. 2004)

- 14,160 acres Northern Portion of PAPA
- Year-Around Drilling In Mule Deer Crucial Winter Range And Greater Sage Grouse Breeding, Nesting, And Wintering Habitats In Management Areas 4 And 5 from 3 well pads
- Construction Of 107-mile condensate pipeline to minimize truck traffic from individual well pads.
- Improved Drill Rig Emissions through Tier 2 engine equivalent controls
- Expanded Mule Deer Study

Finding of No Significant Impact, Decision Record For ASU Year-Round Drilling Demonstration Project (SEPT 2005)

- Year Round drilling locations for Ultra, Shell and Anschutz.
- Noise and traffic monitoring
- Rig emission control studies



# Supplemental Environmental Impact Statement for the Pinedale Anticline Oil and Gas Exploration and Development Project (SEIS)

## Summary of Reasons Leading to this Decision

- Proponents long term development plan changed from that analyzed in 2000
- Improvements In Understanding Of Geology Allowed Access To More Of The Reserve
- Analysis Thresholds In 2000 ROD Were Being Reached Or Were Being Exceeded
  - NOx
  - Maximum Well/Well Pad Limit in Many of the Management Areas



# SEIS Background Cont.

## Summary of Reasons Leading to this Decision

- Operators Were Unable To Maintain Efficient And Qualified Workforce With Seasonal Restrictions
- Retention/Deployment of Higher Efficiency Lower Emission Drill Rigs and Other Equipment Was Hampered By Seasonality Of Work
- Unanticipated Impacts To Wildlife Species Were Being Experienced With Scattered Development, Intense Seasonal Activity During Summer Months And Delayed Reclamation
- Large Seasonal Workforce was Taxing Local Community.



# Alternatives

## Alternative A

Continuation of PAPA ROD- 700 well pad limit

## Alternative B

Proposed Action 1- Relaxation of Seasonal Restrictions with Concentrated Development Areas

## Alternative C

Proposed Action 2- Relaxation of Seasonal Restrictions with Concentrated Development Areas and No Year Round drilling areas.

## Alternative D

Preferred Alternative

## Alternative E

Seasonal Restrictions Remain in Place with PAPA-wide Management Areas

Public Comment received on the Draft SEIS (12/2006) resulted in the Revised Draft SEIS (12/2007). The Revised Draft SEIS added Alternatives D and E

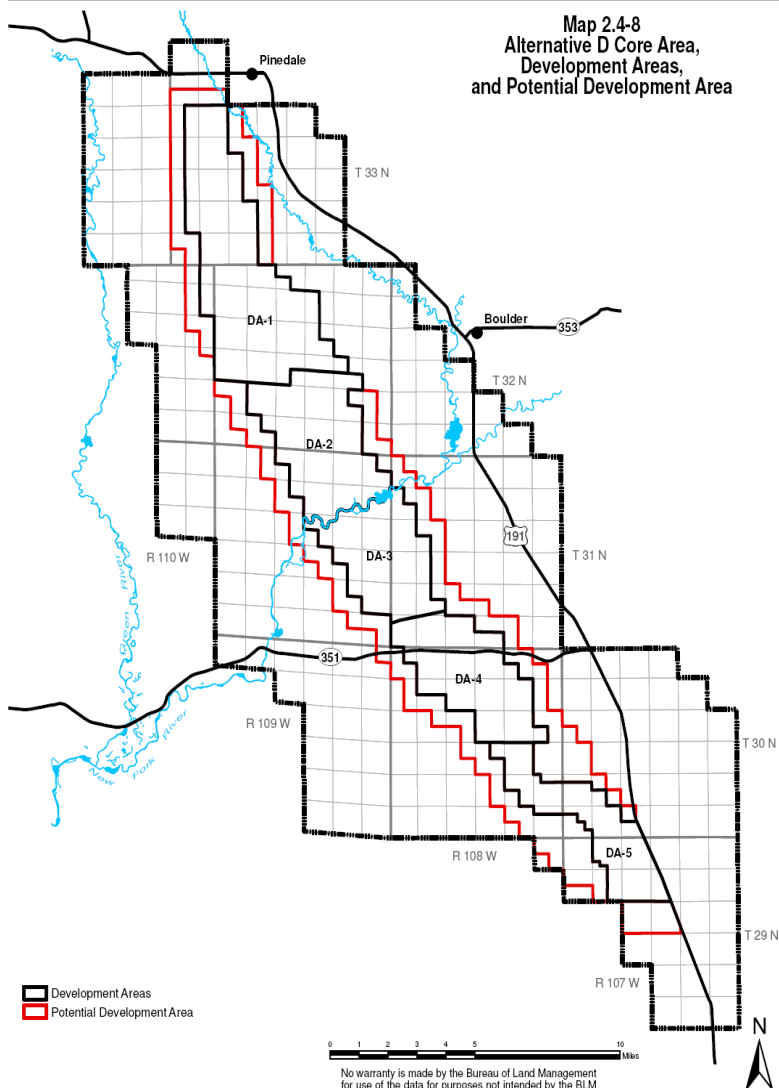


# SEIS Preferred Alternative

Public Participation, Existing Development and Alternatives

Chapter 2

Map 2.4-8  
Alternative D Core Area,  
Development Areas,  
and Potential Development Area



2-xx

Pinedale Anticline Revised Draft SEIS

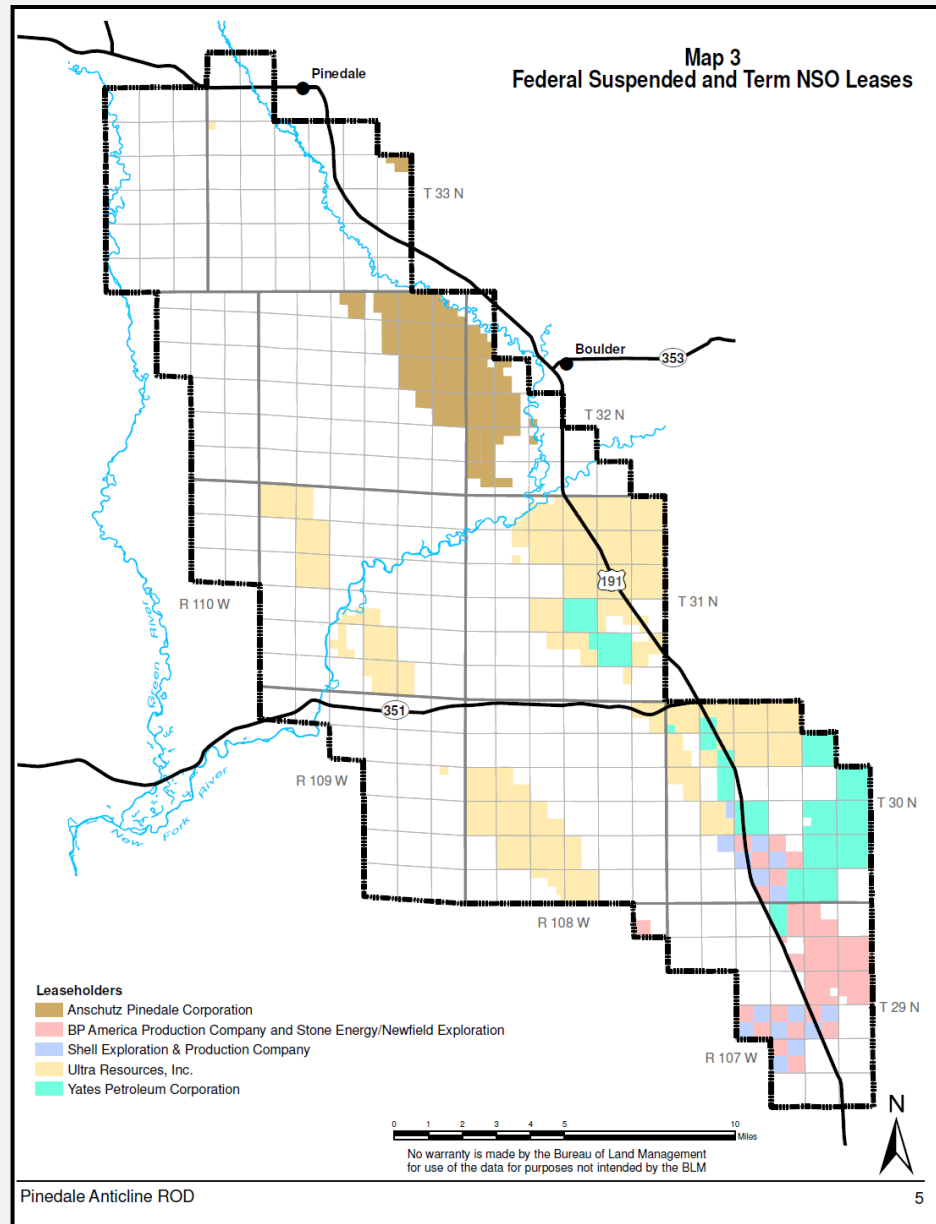
- Spatially and Temporally phased
- Year-round drilling
- Concentrated development
- Field-wide allowance of exceptions
- Centralized facilities for wildlife, reclamation, visibility, and ozone protection
- Flank areas (64% OF PAPA); About 87,000 acres are either leased but activity suspended or not leased
- Mitigation for wildlife
- Establishment of Mitigation Fund
- Air emissions must be reduced 80%
- 4,399 new wells (not more than 600 total well pads)



# Lease Suspensions in the Flanks

BLM

Pinedale Field Office



# Consultation and Coordination

Group	Position
State of Wyoming	Supports Preferred Alternative
State of Wyoming Department of Environmental Quality- Air Quality	Concerned with Air Quality, especially ozone. Willing to work with the BLM to find solutions.
State of Wyoming Department of Environmental Quality- Water Quality	Concerned with Water Quality, especially hydrocarbon detection in some industrial wells. Willing to work with the BLM in monitoring and mitigation
State of Wyoming Game and Fish Department	Concerned with mule deer and sage grouse populations. Support the Preferred Alternative
Sublette County	Concerned with the monitoring and mitigation fund as well as socioeconomic impacts



# Decision: Key Definitions

**Delineation:** Determination of the productive extent of the field.

**Year Round Development:** Construction, Drilling, Completions and Production (Exec Summary, iii).

**Transition:** Period of time provided to the operators to, among other things, determine operating schedules and construction windows, identify pads for interim-reclamation, and acquire new equipment.

**Core Area:** Generally the 2-3 mile wide by 25-30 mile long crest of the Anticline formation (45,415 acres; 23% of PAPA) divided into 5 Development Areas.



# Decision: Key Definitions Cont.

**Development Areas:** 5 specific geographic areas within the Core Area.

**Potential Development Area:** Generally a ½ mile buffer outside of the Core area with specific management and development constraints (24,875 acres; 12 % of PAPA).

**River Corridor:** That area within 1 mile either side of the center-line of the New Fork River, with specific management parameters emphasizing raptor management.

**Flanks:** Area outside of the Core and the Potential Development Areas (127,740 acres; 64% of the PAPA).



# Decision: Key Definitions Cont.

**Concentrated Development:** The method of developing the PAPA whereby development activities are generally located in discrete geographic blocks leaving large percentages of the PAPA free of intensive development activity at any given time.

(Exec Summary, iii): Concentrated development is simultaneous construction, drilling, completions and production.

**Lease Suspension:** An administrative status of a lease relieving the lease-holder from the requirement to develop their lease within a regulatory established timeframe.

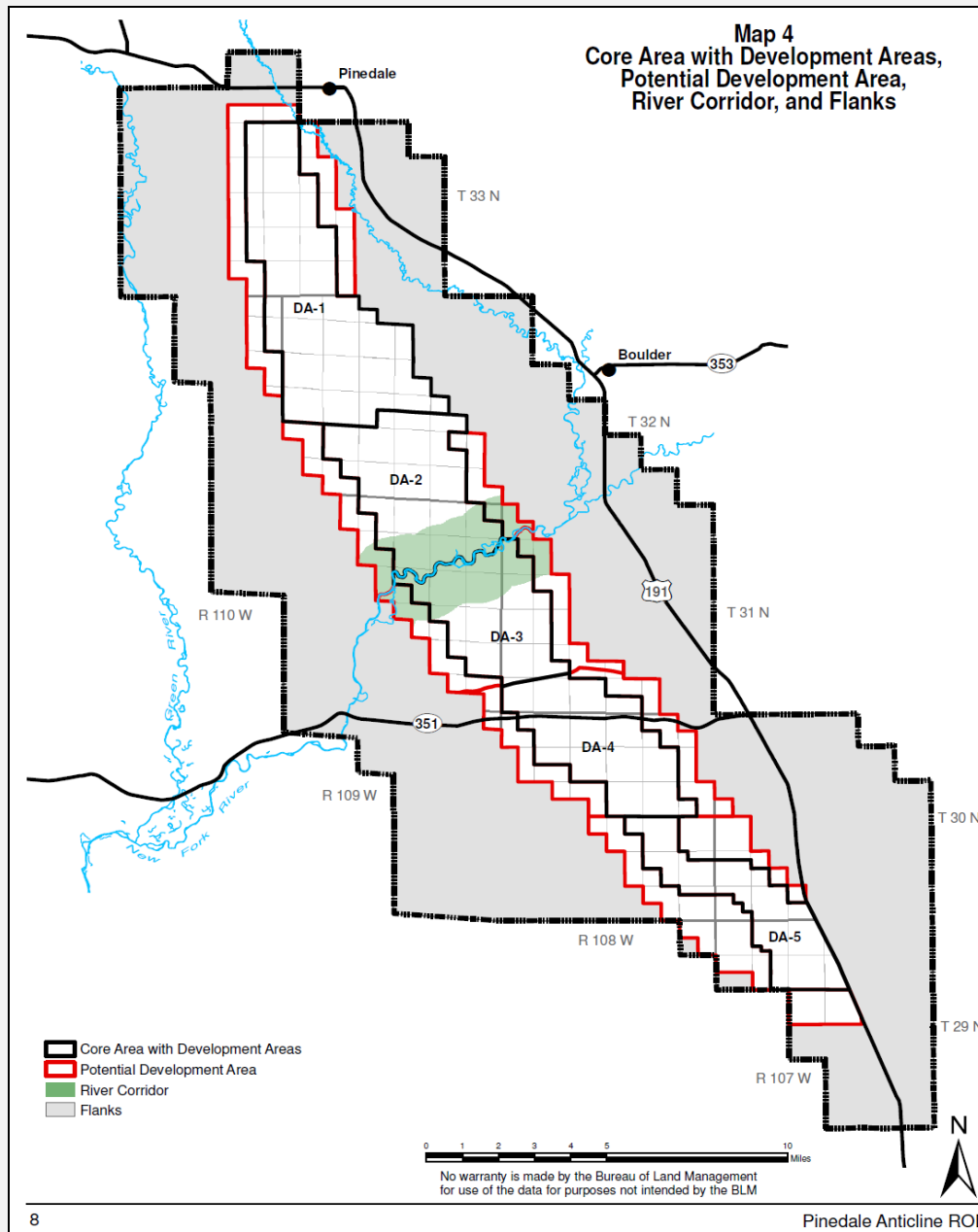


# Decision

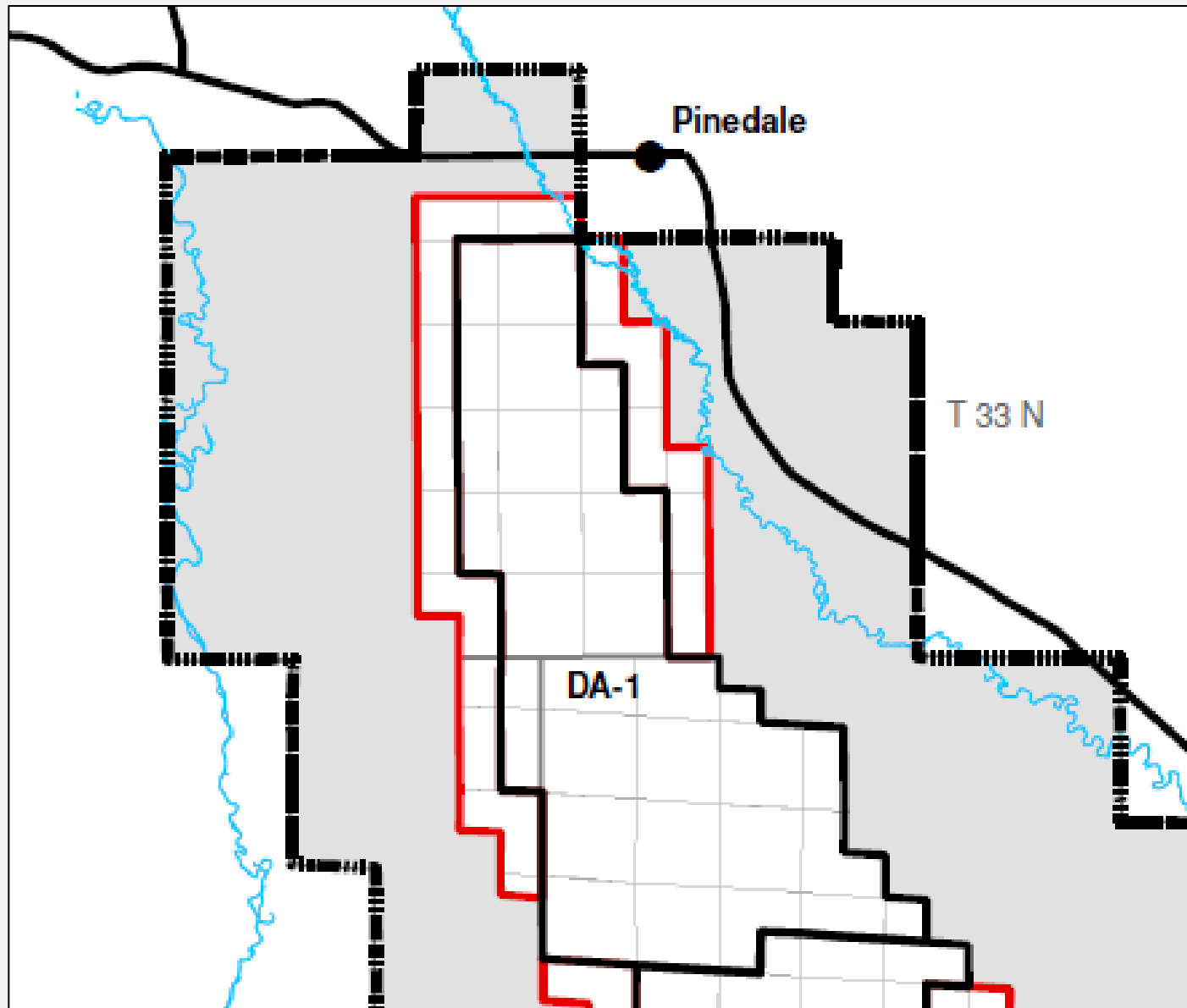
- 4399 wells from no more than 600 well pads
- 24 month “transition/delineation period”
- Annual Planning Meeting
  - Annual and 10 year planning
- Year round development by granting of exceptions
- Use of “concentrated development” and Development Areas
- Minimum 5 year lease suspensions on 49,903 acres based on return of developed areas to “functioning habitat”
- No more than 1 well pad per quarter-section PER OPERATOR
- Installation of liquids gathering system (165,000 truck trips annually during peak production ARE ELMINATED) or equivalent
- Extensive mitigation and monitoring
- Establishment of the Pinedale Anticline Project Office
- \$36 million proffered at signing of ROD
- Annual contribution to mitigation fund of \$7,500 per well spud
- Continued Management Area Approach (flanks)



# Decision



# Development Area 1

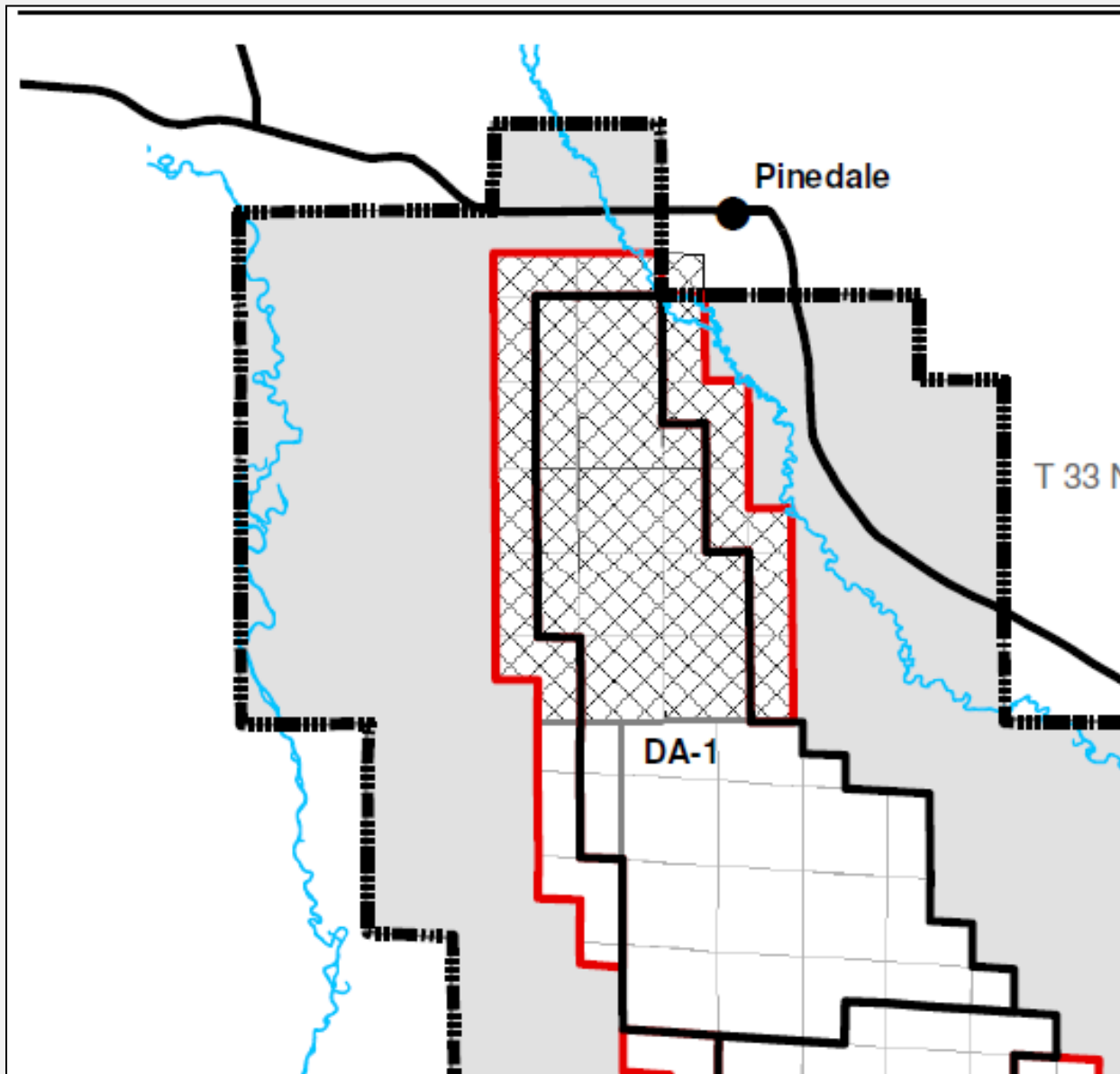


# DA-1 Delineation Strategy

- Delineation drilling in the Stewart Point Area will be conducted during the first 2 years while adhering to seasonal restrictions.
- 2-years following signing of the ROD no additional pads for delineation will be allowed in DA-1.
- If additional delineation is needed, Operators apply and announce application during the annual planning meeting.
- Additional delineation will be limited to 1 mile from the nearest year-round development pad in DA-1.



# DA-1 Stewart Point Area

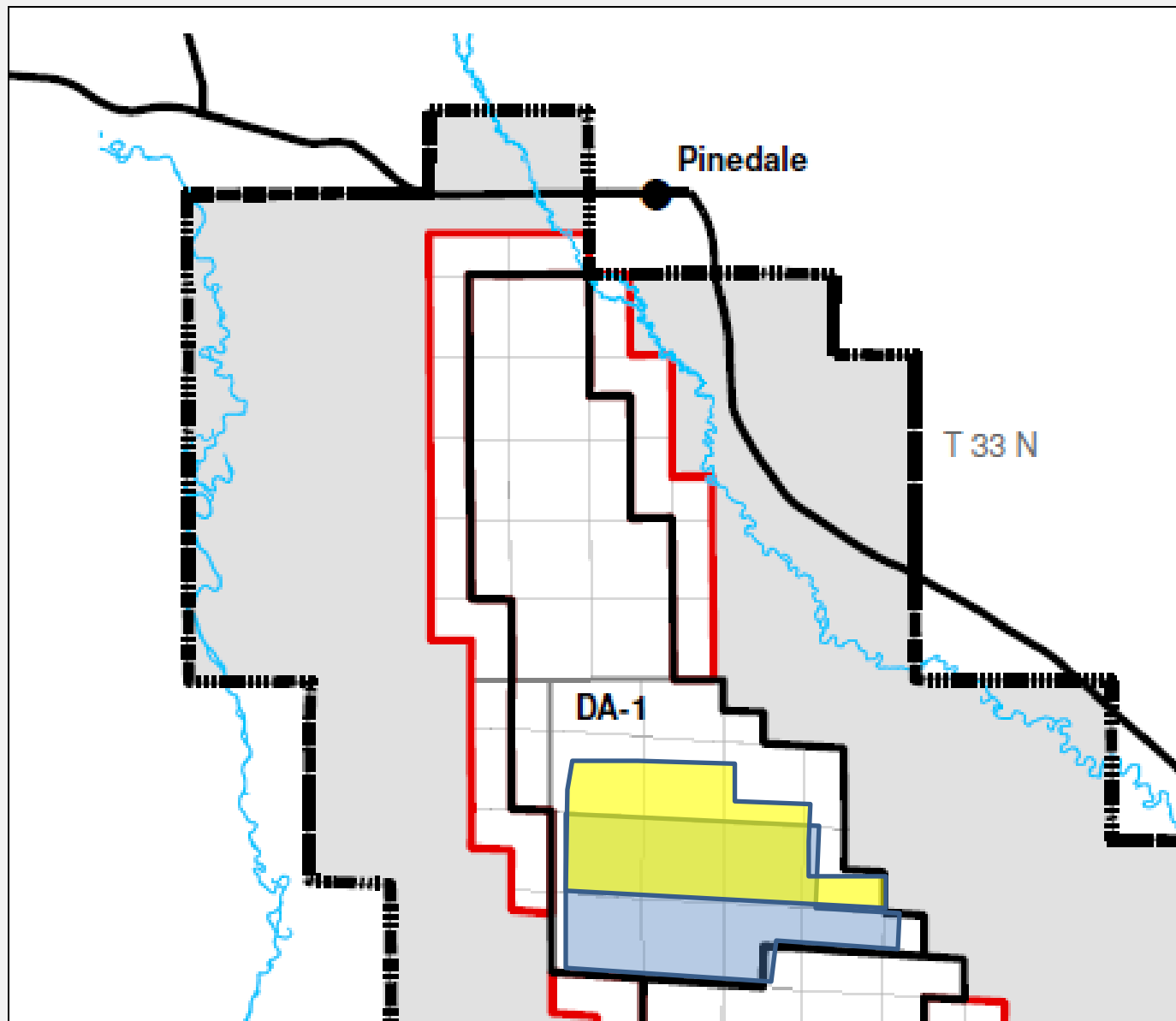


# DA-1 Development Strategy

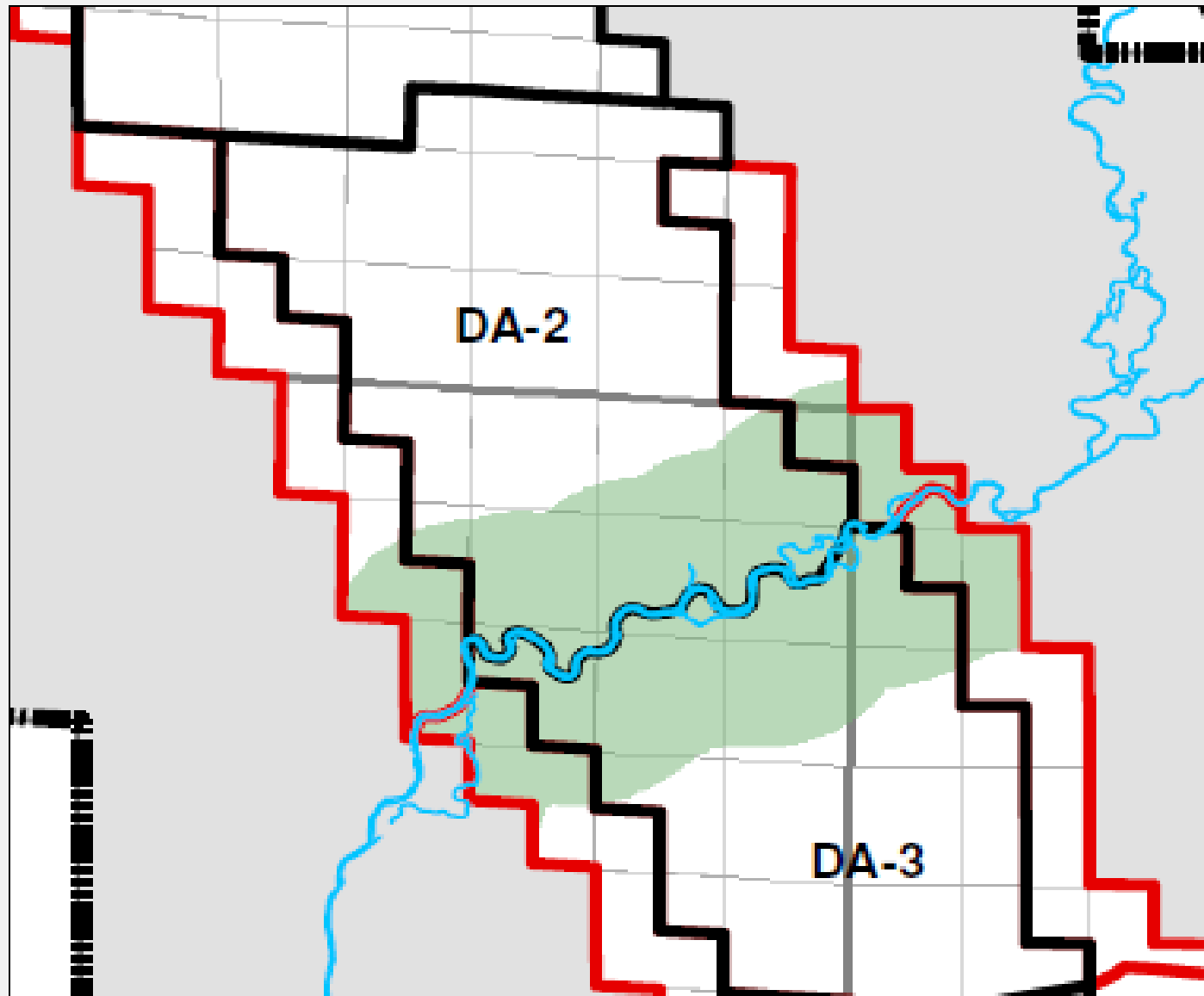
- Year round development authorized with exceptions to seasonal restrictions for big game and greater sage grouse subject to: concentrated year around development proceeds south to north in an area no larger than 6 square miles at any time.
- 6 square mile area should be no more than 2 miles north to south except when DA-1 narrows moving north due to topography.
- Recommendations for concentrated development will be considered and reviewed at the annual planning meeting.



## DA-1:



# Development Area 2



# DA-2 Delineation And Development Strategy

## DELINEATION

- Year-round delineation is allowed in DA-2 with exception to restrictions for big game and greater sage grouse seasonal habitats

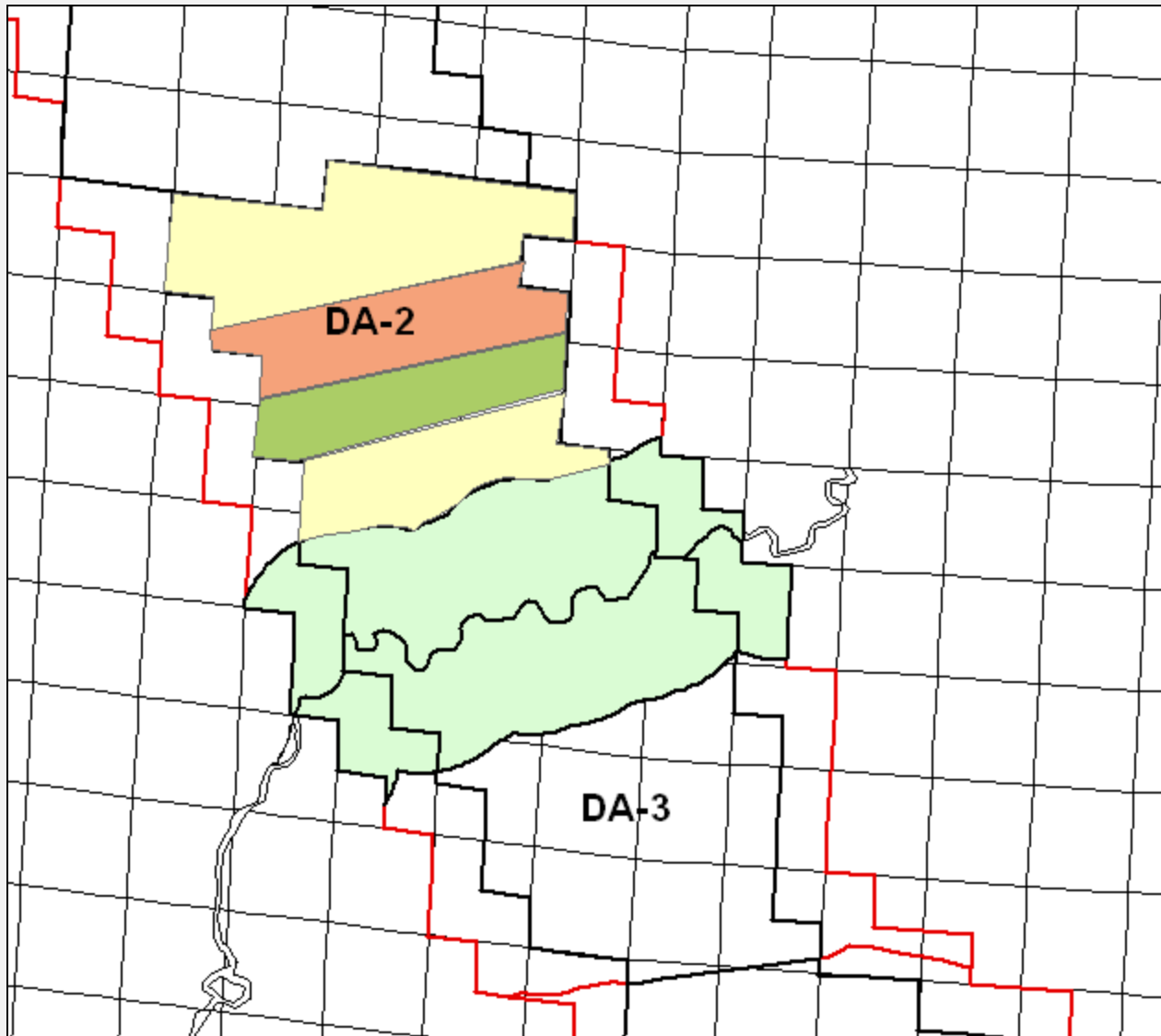
## DEVELOPMENT

- Year-round development with exceptions allowed
- Two groups of drilling rigs, one in the south and one in the north converging in the middle\*

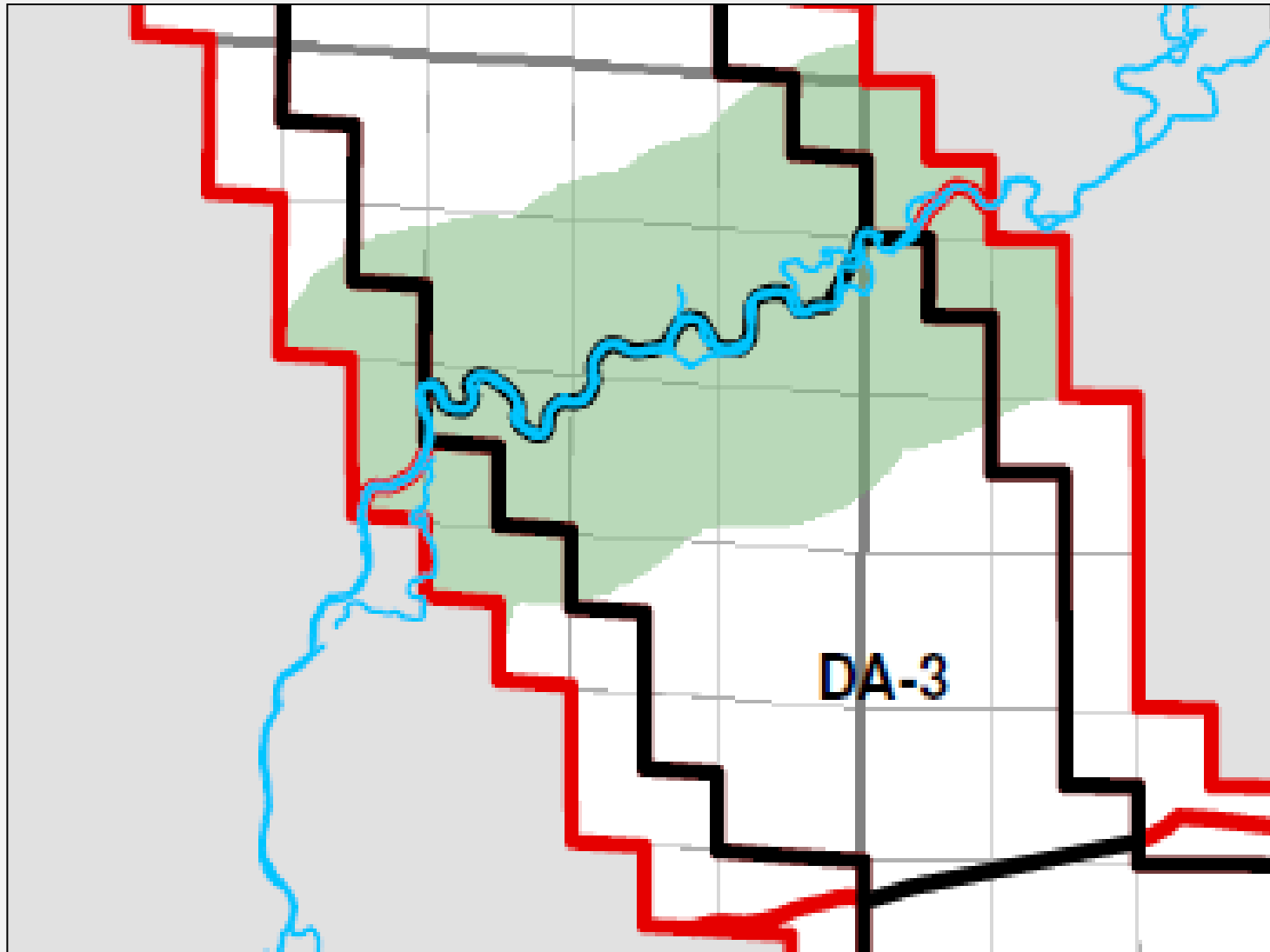
\* Anschutz and Yates are not constrained in this way, they may develop their leases as long as their lease suspensions in the flanks are maintained. Anschutz is authorized year round drilling with no more than 3 rigs and 3 active well pads at any one time. Yates refused year round drilling access.



# DA-2:



# Development Area 3



# DA-3 Delineation Strategy

- Allowed with exception to seasonal restrictions for big game ONLY.
- Seasonal restrictions for greater sage grouse will apply for delineation



# DA-3 Delineation Strategy Cont.

Delineation occurs in two phases

- Phase 1 begins with ROD signing and occurs on a north-south line in the western-most portion of Range 108 West.
  - Then proceeds east towards the east boundary of DA-3
- Phase 2 begins:
  - When phase 1 is complete or
  - 18 months prior to development beginning in DA-3 with BLM AO approval, whichever occurs sooner
  - Phase 2 delineation precedes development and will occur on a north-south line in the eastern-most portion of Range 108 West
    - Generally occurs within a 1.5 mile area (east-west) at any time and proceeds westward



# DA-3 Delineation Strategy Cont.

Intent is that Phase 1 and Phase 2 delineation will not occur at the same time.

- However, should phase 2 delineation commence prior to completion of phase 1 delineation, Phase 1 delineation will cease until completion of Phase 2 delineation.
- Operators may request this modification to the delineation progression at the annual planning meeting.



# DA-3 Development Strategy

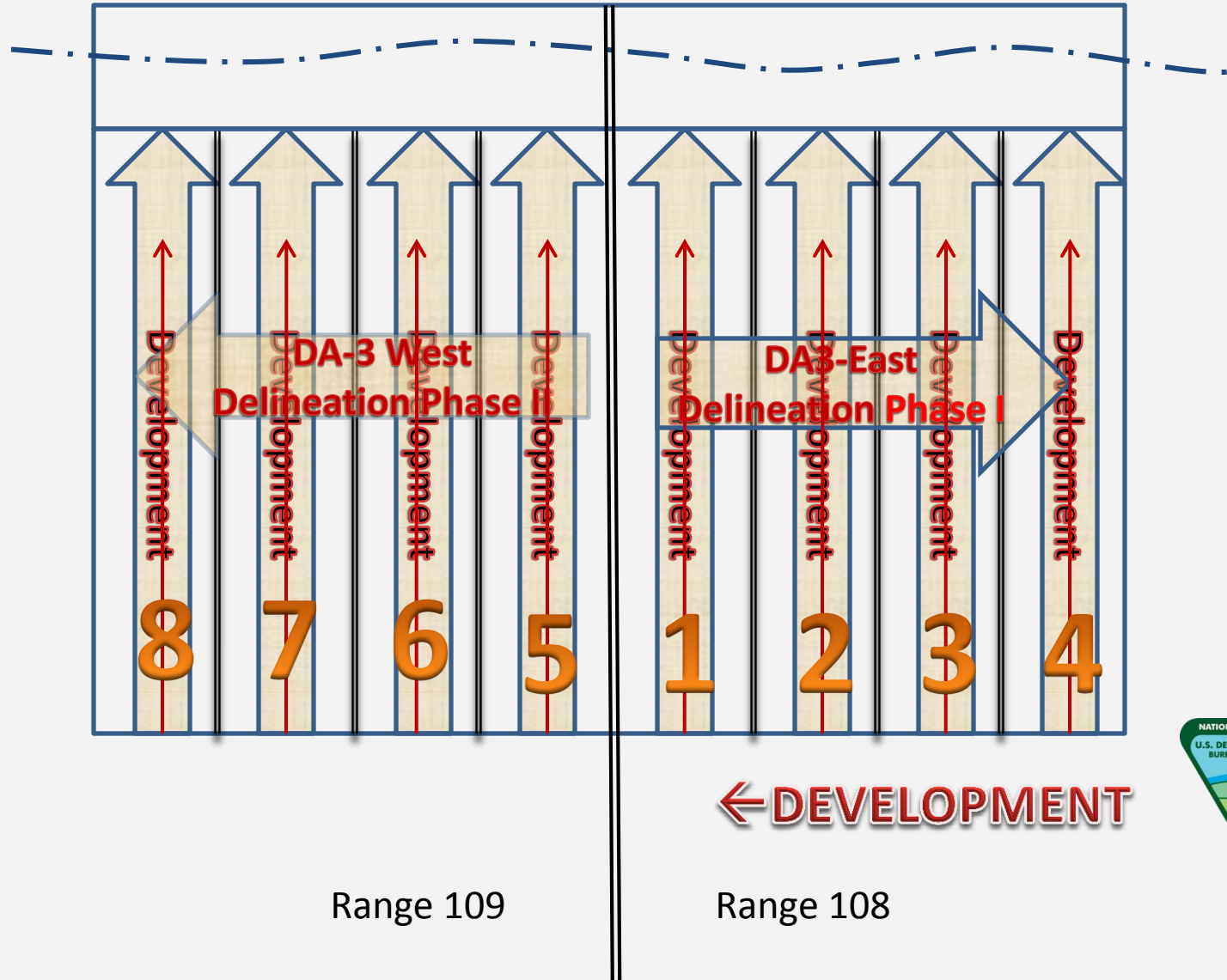
- Year round development with exceptions allowed
- Development in DA-3 may begin once the southernmost drill rigs are one mile north of all portions of the river corridor in DA-2.
- Initiation of year around development as well as the movement, location and concentration of drill rigs in DA-3 is requested and considered during the annual planning meetings.
- Development in DA-3 proceeds east to west.



# DA-3 Delineation and Development

BLM

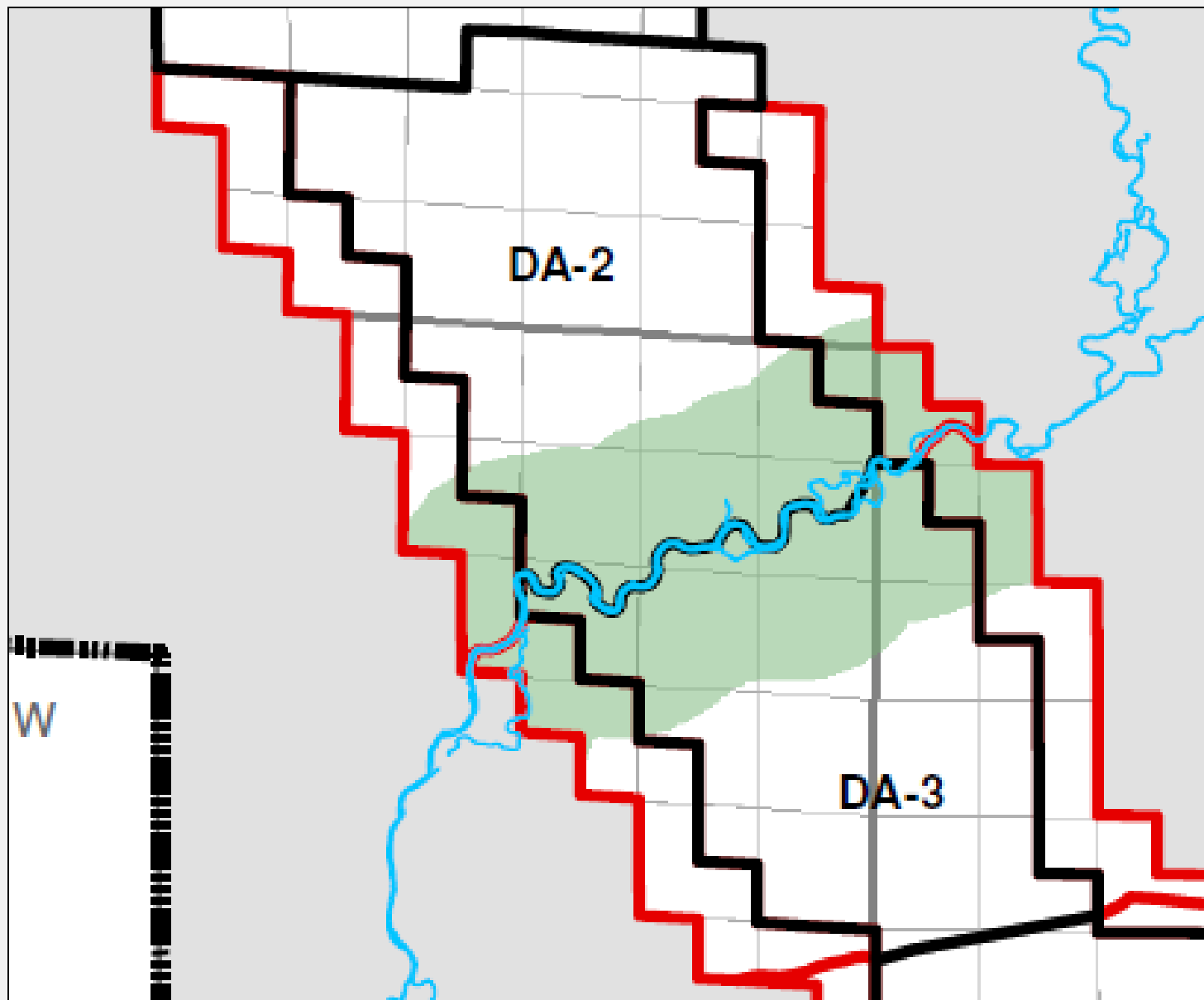
Pinedale Field Office



# The River Corridor

BLM

Pinedale Field Office



# The River Corridor Development Strategy

- Due to concentrations of raptors and raptor nests, development is expected to occur only while adhering to seasonal habitat restrictions for raptors (Nov 1 to August 15) within 1 mile on either side of the river.
- Compliance with Bald and Golden Eagle Protection Act and Migratory Bird Treaty Act.
- BLM will work with USFWS cooperatively to develop and utilize measures to comply with these laws and allow for the systematic development of the area.



# The River Corridor

## Development Strategy Cont.

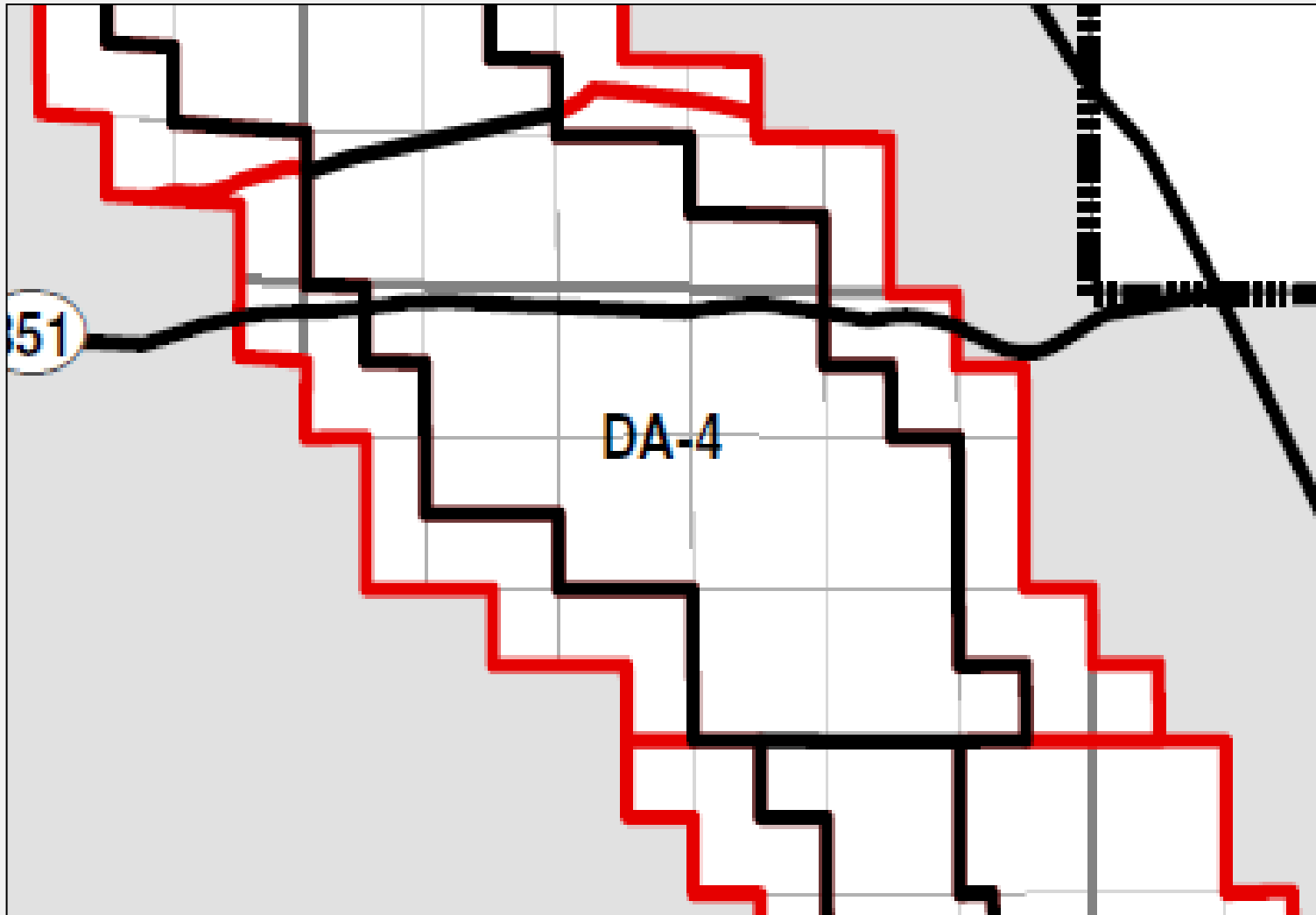
- The location of pads, timing restrictions, and mitigation measures will be determined at the annual planning meeting .
- Should year-round development and delineation be allowed in the river corridor, development in DA-3 will be initiated when year-round development moves 1 mile north of the **New Fork River (centerline)** in DA-2
- Previously determined that YRD could not be granted through out the River Corridor so DA3 development begins when drilling reaches 1 mile north of the **River Corridor**. All drilling exceptions are via case by case evaluation.



# Development Area 4

BLM

Pinedale Field Office



## Pinedale Field Office



# DA-4 and DA-5 Delineation Strategy

- Delineation is authorized year-round in DA-4 with exceptions to restrictions for big game and greater sage grouse seasonal habitats.
- Delineation is authorized year-round in DA-5 with exception to seasonal restrictions for greater sage grouse seasonal habitats.



# DA-4 Development Strategy

- Development is authorized on a year-round basis through exceptions to seasonal restrictions for big game and greater sage grouse.
- There are no spatial progression requirements in DA-4.
- Historically few wildlife conflicts and resource concerns are primarily related to cultural/paleontology and low reclamation potential soils.



# DA-5 Development Strategy

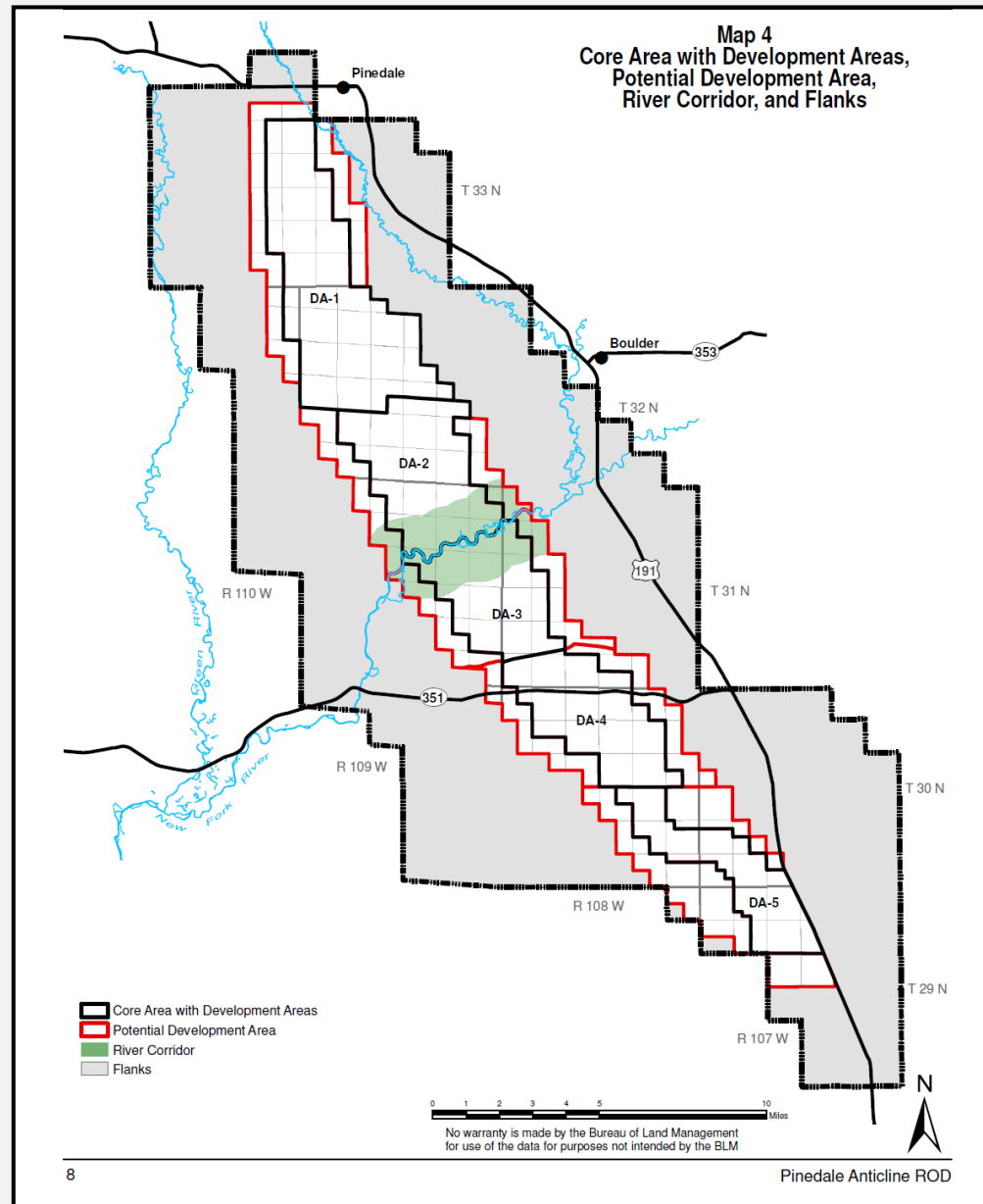
- Development is authorized on a year-round basis through exceptions to seasonal restrictions for big game and greater sage grouse.
- There are no spatial progression requirements for YRD in DA5. Historical and current management actions are focused on sage grouse habitat.



# Potential Development Area

BLM

Pinedale Field Office



# PDA Development Strategy

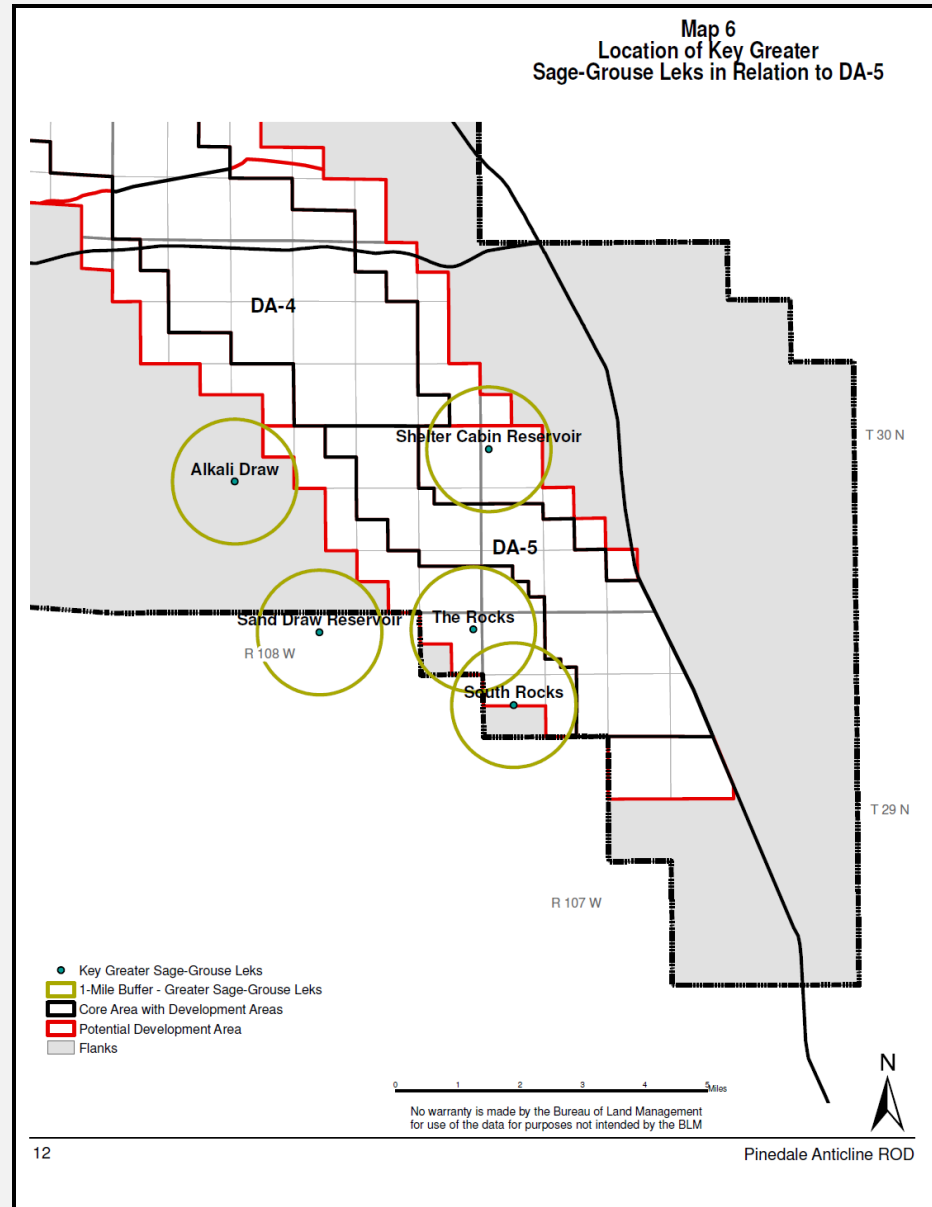
- The PDA is available for year-round development.
- Requests for year-round development will be reviewed at the annual planning meeting.
- If approval is granted for YRD in all or part of PDA 5, it will only occur within one mile of one of the five designated key greater sage grouse leks at any time.



# DA-5 Sage Grouse Leks

BLM

Pinedale Field Office



# Flank Delineation and Development

Those portions of the Flanks which are leased and have not been suspended (40,840 acres):

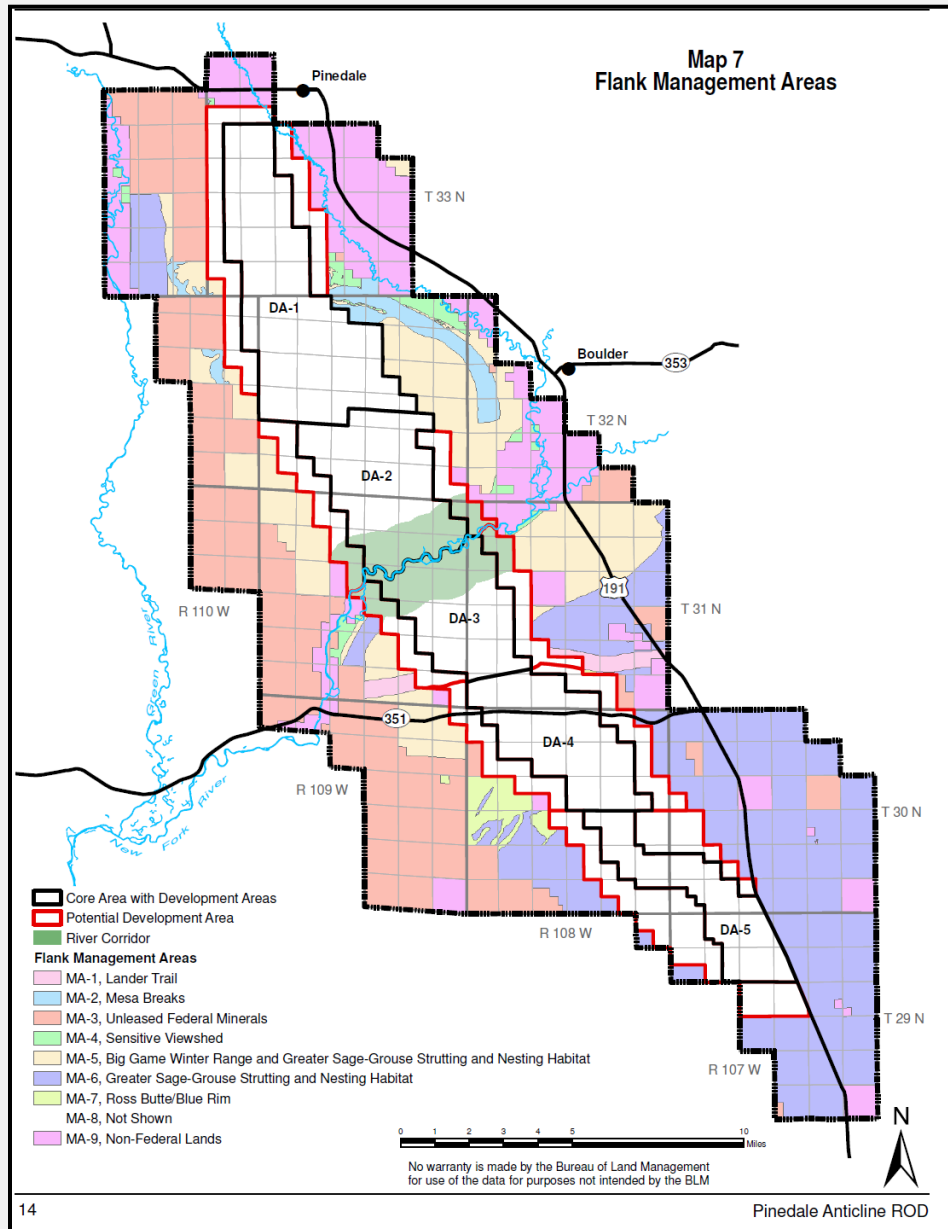
- Delineation and development with adherence to seasonal restrictions
- Subject to management actions associated with one or more of the 8 Management Areas (MA)s.
- Number of Pads and Acres of Disturbance are Constrained (1-4 pads and generally <40 acres/section).



# Flank Management Areas

BLM

Pinedale Field Office



# Management Area Requirements

## MA-1 Lander Trail

- No Surface Occupancy (NSO) 0.25 mi either side of the Lander Trail
- No new surface disturbance on trail
- Visibility analysis required within viewshed and outside 0.25 NSO area



# The Amended Lander Trail



Programmatic Agreement (PA)

13 interested partners

PA. executed August 2010

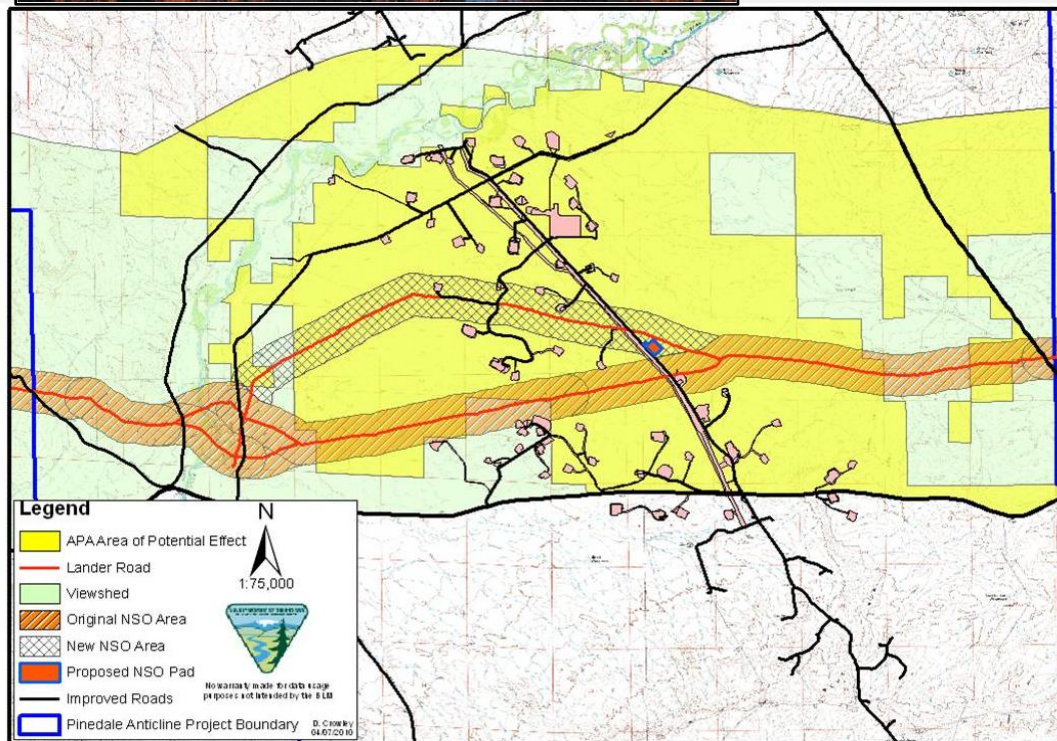
Mandated by the SEIS and ROD.

Allows for further development  
along the Lander Cutoff

Wagner Variant of the trail

Purchase of the New Fork River.

The Sublette County Historical Society



# Management Area Requirements

## MA-2 Mesa Breaks

- Permits not approved unless determined impacts less than outside
- Avoid disturbance on 10% or greater slopes and highly erosive soils or soils with high color contrast

## MA-3 Unleased Federal Minerals

- Decision deferred until RMP is completed
- RMP made most of this area UNAVAILABLE



# Management Area Requirements

## MA-4 Sensitive Viewshed

- New roads avoided where possible
- Facilities and disturbance screened where it would degrade visual quality
- Permanent facilities which cannot be mitigated for visual resources will not be authorized
- Disturbance on 10% or greater slopes and soils which are highly erosive or with high color contrast will be avoided
- Maximum 4 well pads per section
- Maximum 40 acres surface disturbance per section



# Management Area Requirements

## **MA-5 Big Game Winter Range and Sage-Grouse Strutting and Nesting habitat**

- Maximum 2 well pads per section
- Maximum 40 acres surface disturbance per section

## **MA-6 Sage Grouse Strutting and nesting habitat**

- Maximum of one well pad per section
- Maximum of 40 acres of surface disturbance per section



# Management Area Requirements

## MA-7 Ross Butte/Blue Rim

- Maximum 1 well pad per section per Operator
- Maximum 40 acres surface disturbance per section
- Watershed protection plans required for cumulative disturbances greater than 10 acres which demonstrate the method Operators will use to prevent measurable degradation or aggradation within the watershed.

## MA-8 Minimal Conflict Area

- Dissolved into other MAs but maintained for correlation with 2000 ROD



# Management Area Requirements

## MA-9 Non-Federal Lands

- Private and state lands not under the jurisdiction of BLM
- Compliance with federal laws protecting species and habitats (ex. Migratory Bird Treaty Act) still apply.



BREAK 5 MINUTES



# Implementation: ROD Section 4.0

## Section 4.1.1 Visibility

- Revised Draft modeling revealed multiple days of greater than 1.0 dv change at 8 Class I and sensitive Class II areas. Bridger Wilderness predicted to be the most heavily impacted with 67 days of visibility impairment.
- Timeline codified in the ROD requiring reduction in emissions contributing to visibility impacts at the Bridger Wilderness.
  - Reduced to 40 days within 12 mos (9/12/2009)
  - Reduced to 10 days within 42 mos (3/12/2012)
  - Reduced to 0 days within 72 mos (9/12/2014)



# Implementation: ROD Section 4.0

## Section 4.1.1 Visibility Cont.

- ROD required the following actions to manage visibility:
  - Establishment of the 10-year rolling forecast
  - Operators will reduce emissions to 2005 levels (40 days 1 year requirement)
  - Operators will accelerate the use of emission controls to achieve the 80 percent drilling engine NOx emissions modeled reduction. (10 days/42 month requirement)
  - No later than the fifth annual planning meeting (2013), Operators will provide an evaluation of alternatives and identify a plan of action for meeting the 0 days of visibility impairment. Must include modeling of each alternative evaluated. If cannot be achieved, a reduction in the pace of development can be used by the BLM.



# Implementation: ROD Section 4.0

## Section 4.1.1 Continued

- BLM worked with DEQ extensively to determine what information was necessary for inclusion in the 10-year rolling forecast. This information was codified in a letter from the AO to the Operators on May 18, 2009. The reporting requirements include:

### From Production Sources:

- Stationary Engines
- Heaters
- Tanks
- Dehydration Units
- Pneumatic Pumps
- Drill Rigs
- Completions
- Construction Mobile
- Fugitives
- Venting & Blowdowns
- Truck Loading

### From Compressor Stations:

- Pinedale Compressor Station
- Falcon Compressor Station
- Paradise Compressor Station
- Bird Canyon Compressor Station\*\*

\*\*Note: Once the expansion has been completed this must be reported. Additionally, the responsible Operator must allocate emissions between the Jonah and Anticline fields and, provide enough information to determine how the emissions allocations were derived.

### Other Sources:

- Granger Gas Plant
- Central Gathering Facilities associated with PAPA LGS



# Implementation: ROD Section 4.0

## Section 4.1.2 Ozone

- Within one year of signing the ROD, the emissions inventory for NOx and VOCs will be refined.
- New modeling will be conducted using the refined emissions inventory and will include all WDEQ BACT requirements and a sensitivity analysis to determine appropriate reductions in ozone precursor emissions.
- Model results will be evaluated to identify any additional emission control actions that may be necessary by either the BLM and/or WDEQ.
- Within 2 years of the ROD, USQ will install a LGS to all existing wells. After 2 years, all new wells will be connected to the system unless waived by the BLM. Other operators shall submit within one year a plan for reducing VOC emissions equivalent to an LGS.
- Within 90 days and on an annual basis thereafter, individual ozone contingency plans will be developed by the Operators with the WDEQ and BLM.



# Implementation: ROD Section 4.0

## Section 4.2 Groundwater Resources

- ROD directed the BLM, in coordination with the WDEQ, EPA and the Operators, to develop both an Interim and Final Groundwater/Aquifer Prevention, Mitigation and Monitoring plan and funding strategy in accordance with the BLM's Regional Framework for Water Resources Monitoring Related to Energy Exploration and Development.
- Goals of this plan included a compilation of all existing groundwater data to identify any known Data Gaps.
  - Characterization of the Groundwater Resources
  - Identify and develop mitigation for potential sources of groundwater contamination
  - Modification of the existing Groundwater monitoring system.



# Implementation: ROD Section 4.0

## Section 4.2 Groundwater Resources cont.

- BLM will continue to identify and mitigate potential sources for contamination of water hydrocarbons. Mitigation, which can be modified through adaptive management will include:
  - Operators will provide certification within 6 mos of the ROD that back flow prevention devices have been installed on all water supply wells and locked to prevent unauthorized access.

## Section 4.3 Grazing Resources

- Operators will develop a Memorandum of Agreement with Livestock permittees to address livestock death and injuries, and other projects not funded by the [Mitigation] Fund



# Implementation: ROD Section 4.0

## Section 4.4/4.5 T&E and Wildlife/Aquatic Resources

- Recovery Program payment determination for Endangered Colorado River fish species: Colorado pikeminnow, humpback chub, bonytail and razorback sucker.
- Continued site specific surveys for Ute ladies'-tresses and black-footed ferrets.
- Raptor anti-perching devices within 0.25 miles of prairie dog towns and powerlines should be buried near prairie dog towns and avoidance of power poles in prairie dog towns.

## Section 4.6: Offsite Mitigation, Monitoring & Mitigation Fund and the PAPO



Jennifer Frazier,  
Principal Engineer  
Wyoming Department of Environmental Quality  
JIO/PAPO Interagency Team

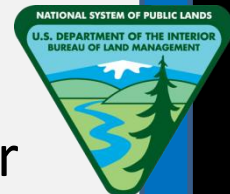


# Pinedale Anticline Project Office

## Background

The PAPO was established to:

- Obtain, collect, store, and distribute monitoring information to support adaptive management and analyze mitigation projects in support of implementation of the ROD
- Provide oversight of monitoring and mitigation activities discussed in the ROD
- Implement or oversee mitigation and monitoring projects utilizing the Pinedale Anticline Monitoring and Mitigation Fund which is managed by the Wildlife Heritage Foundation of Wyoming
- It was anticipated that the PAPO would be necessary for at least 25 years or until 2033



# Pinedale Anticline Project Office

## Organization/Membership

- Staffed by full-time employees or contractors of the BLM, WDA, WGFD, and DEQ and housed within the BLM PFO
- Oversight provided by a Board of Directors consisting of agency heads from the above agencies plus a Sublette County Commissioner appointed by the Governor
- Local operations management provided by a Project Coordinator



# Pinedale Anticline Project Office

## Responsibilities/Duties

- Provide oversight of the selection and effectiveness of offsite mitigation
- Monitor for reclamation success
- Monitor wildlife populations as outlined in the Wildlife Monitoring and Mitigation Matrix
- Validate and coordinate monitoring
- Provide information regarding impacts, monitoring data, and mitigation success
- Ensure compliance with WDA rules and regulations (WDA staff in PAPO)
- Ensure compliance with DEQ air and water quality rules and regulations (DEQ staff in PAPO)



# Pinedale Anticline Project Office

## Project Submission and Review Process

- Year long “open season”
- October 31 deadline for funding next calendar year
- All applications posted on our webpage for review and comments by the public until November 30
- JIO/PAPO team will begin to review and rank applications on or about December 1
- Project ranking recommendations will be made to the Board of Directors by March 1 for a minimum 30-day review prior to the next meeting
- Applications will be voted on by the Board during the next Board meeting, typically in April



# Pinedale Anticline Project Office

Pinedale Field Office

BLM

## Overview of Expenditures to Date

- Disbursements made to date are about \$8.5 million
- Projects funded include:
  - Conservation Easements: Murdock, Sommers-Grindstone
  - Questar-Sublette Mule Deer Monitoring
  - Shell-Pronghorn Collaring Study
  - Mesa Mule Deer Winter Habitat Improvement Project
  - Annual Monitoring: Mule Deer, Pronghorn, Pygmy Rabbit, Raptor, Sage-Grouse, Prairie Dog
  - University of Wyoming Spatial Air Quality Assessment
  - Diesel Emissions Reduction Act Contribution
  - Woodstove Change Out Program



# IMPLEMENTATION : Process For Consideration of Development Proposals

Tim Zebulske,  
Supervisory Natural  
Resource Specialist  
Pinedale Field Office  
BLM



# Implementation:

## Annual Development Planning

**Purpose** – To ensure that proposed development comports with development guidelines in the ROD

**Cycle** – Annual Meetings

- Feb. – Development Planning: schedule, progression through DAs, location, timing, 10 yr. rolling forecast, reclamation
- July - Air/water data review: annual monitoring data, water usage
- Oct. – Wildlife data from previous winter/spring



# Implementation:

## Annual Development Planning

### **Schedule for Annual Development Plans (ADPs)**

#### August: Operators Submit Annual Development Plans

- Ensure APDs are submitted and are on track to be approved before February meeting
- Conduct Interagency Review (WGF, DEQ, BLM)
  - Review proposed schedule
  - Check wildlife conflicts
  - Review/Discuss Well Pad Occupancy (once on the pad stay on the pad)
  - Review Year-Round Drilling Exception Requests against Development Areas and Rules for Each

#### November: One-on-one meeting with each operator



# Implementation:

## Annual Development Planning

### Decisions to be made at February meeting

- Does proposed action comply with ROD?
- Allow development as proposed or...modify proposed schedule, activities or locations
- Identify any additional mitigation that may be necessary.
- Issue “occupancy” letters to operators indicating which locations they can occupy and when.
- Decision on rig progression through DAs



# Implementation:

## Annual Development Planning

### Decisions To Be Made At July Meeting

- Define plan of action for air milestones (visibility)
- Need for adaptive management and/or additional mitigation

### Decisions To Be Made At October Meeting

- Effects of Mitigation
- Reassessment of Annual Development Plan Based on Data
- Wildlife Monitoring Mitigation Matrix Review
- Additional Monitoring Needs or changes
- Assessment of Water Withdrawals Against
- Need for additional Payments



# IMPLEMENTATION : APD Approval Process

Tim Zebulske,  
Supervisory Natural Resource  
Specialist  
Pinedale Field Office  
BLM



# APD Approval Process

- BLM receives APD from operator, copy posted in binder at front desk for public review
- BLM adjudicator reviews legal location, lease rights, bond validity, Right-Of-Way needs
- BLM Engineer reviews drilling plan
- BLM Natural Resource Specialist (NRS) reviews surface use plan
- BLM NRS schedules site visit with operator and BLM {WGF} resource specialists (wildlife, cultural, range, recreation, etc.)



# Site Visit

## Assess Resource Concerns

Wildlife/habitat

Recreation

Slopes

Archaeology/paleontology

Visual resources

Roads and access

Range/grazing

Existing/future development

Water resources

Vegetation

Soil

Drainage/snow

Facilities/pipelines

Other infrastructure

Potential Mitigation



# Considering All These Resources....

- Where can we put the Location so that the operator can reach their target and BLM can maximize resource protection?
- Goal: Reach agreement in the field and document in notes.



# Revise The APD As Needed To Reflect Changes Made At The On-Site

- Realign road
- Move well pad
- Use soil piles or natural terrain as visual screen
- Increase distance from wildlife/habitat
- Avoid cultural sites, sensitive soils, steep slopes, recreation sites, range improvements
- Combine with existing development/reduce footprint
- Include mitigation in surface use plan



# BLM Writes Environmental Analysis Document

## Environmental Assessment



# Purpose of the Environmental Review

## Determine Significance of Impact

- Based on the context and intensity of Direct, Indirect, and Cumulative environmental effects
- If Impacts Determined Not To Be Significant, THEN Issue Finding of No Significant Impact (FONSI), Decision Record
- If Impacts Determined To Be Significant, THEN Vacate the EA and Prepare Environmental Impact Statement



# Decision Record

- Identify regulations/laws pertinent to the decision
- Describe the selected alternative
- Summarize the required mitigation or limitations
- Reference the FONSI and the fact that effects do not warrant an Environmental Impact Statement
- Explain rationale for the decision and why the selected alternative was chosen
- Information on appeals



# APD Approval

## **Attach Conditions of Approval (COAs) – both for engineering and surface use plan**

- Timing restrictions
- Protection of sensitive sites or features as identified by resource specialists
- BLM guidelines not directly referenced in the APD
- Codify site specific mitigation

**APD and EA DR is signed and dated by authorized officer**



# The Following COA is on Every APD Approved for the PAPA

- Operator must comply with all decisions and applicable terms, conditions, and requirements in the ROD for the Pinedale Anticline Oil and Gas Exploration and Development Project Supplemental Environmental Impact Statement.
- Drilling may not commence until the well has been approved through the annual planning meeting process in accordance with the PAPA FSEIS ROD.



# CLARIFICATIONS?



# Matrix Species Monitored

Therese Hartman

Wildlife Biologist

Wyoming Game and Fish Department

JIO/PAPO Interagency Team



# Matrix Species Monitored

Mule Deer

Pronghorn

Sage-grouse

Pygmy Rabbit

Prairie Dog

Snow/Traffic

Raptor



# Mule Deer Monitoring Objectives

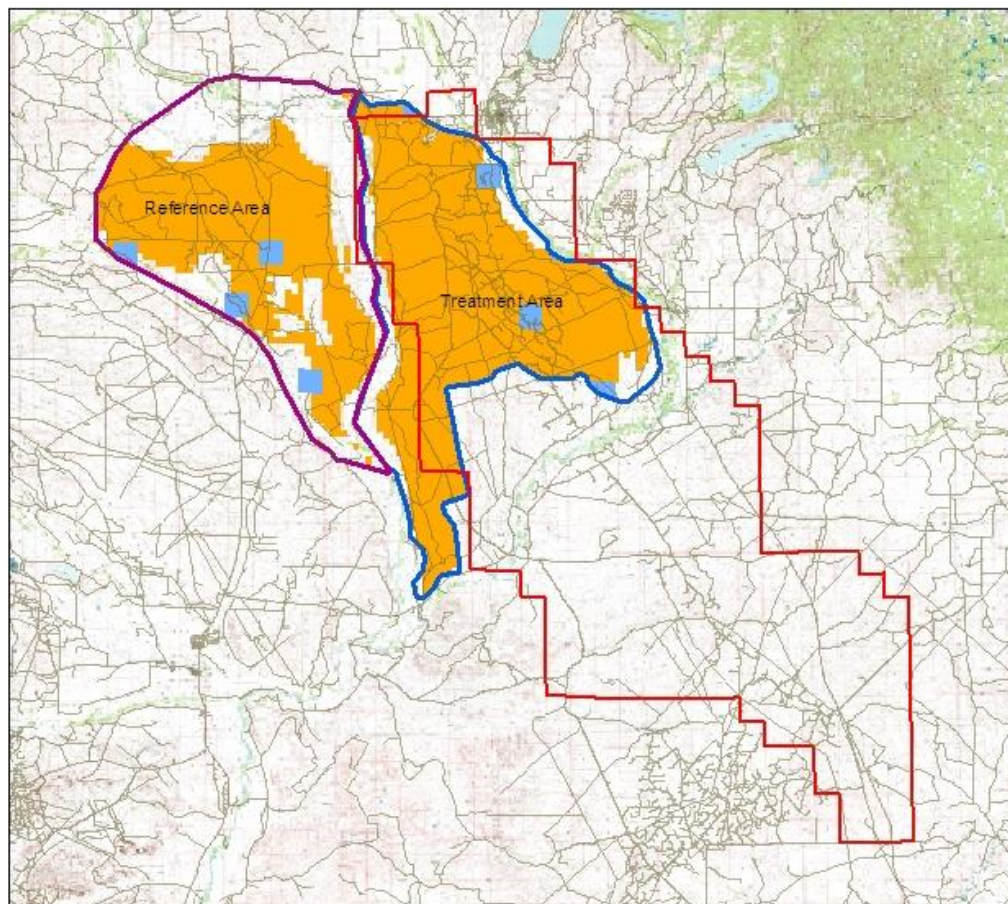
- Monitor mule deer during winter and report changes in population numbers.
- Monitor female survival
- Map collared mule deer locations and migration routes.
- Analyze mule deer distribution and habitat selection



## Mule Deer Monitoring Areas

### Legend

-  RAPA Boundary
-  Reference Area
-  Treatment Area
- Surface Ownership
  -  Bureau of Land Management
  -  Private
  -  State



# Mule Deer Monitoring Costs

YEAR	ANNUAL MONITORING COSTS
2009	\$205,550 \$35,500
2010	\$98,600
2011	\$155,110

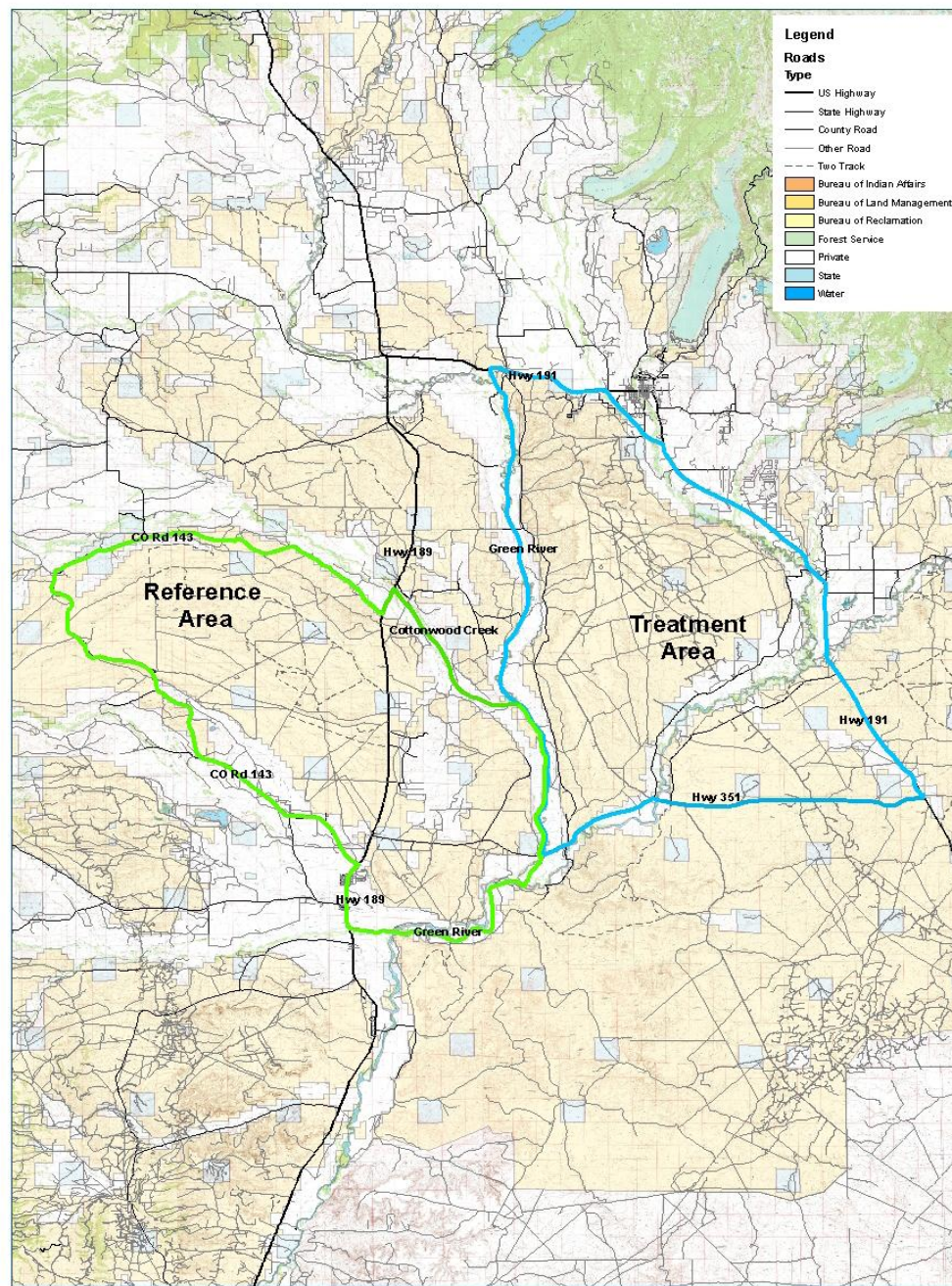


# Pronghorn Monitoring Objectives

- Monitor pronghorn during winter and report changes in population numbers.
- Monitor female survival
- Map collared pronghorn locations and migration routes.
- Analyze pronghorn distribution and habitat selection



## Pronghorn Monitoring Areas



# Pronghorn Monitoring Costs

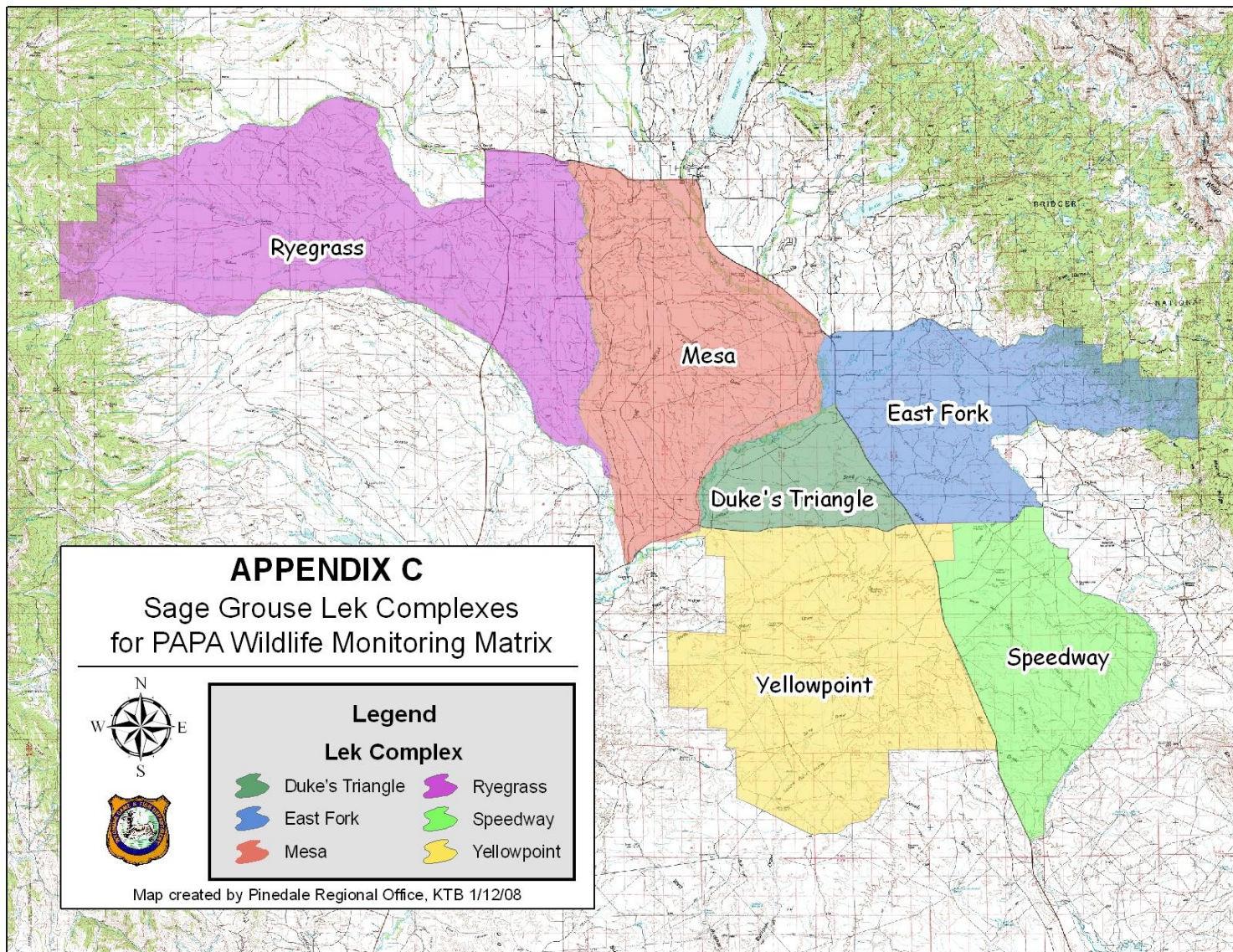
YEAR	ANNUAL MONITORING COSTS
2009	\$217,605
2010	\$163,500
2011	\$165,700



# Sage-grouse Monitoring Objectives

- Conduct lek surveys and report population trends
- Monitor female survival and nest success
- Monitor habitat selection during brood rearing
- Monitor noise levels at leks within PAPA area
- Monitor winter use to identify winter concentration





# Sage-grouse Monitoring Costs

YEAR	ANNUAL MONITORING COSTS
2009	\$209,900
2010	\$122,998 \$22,138
2011	\$44,954

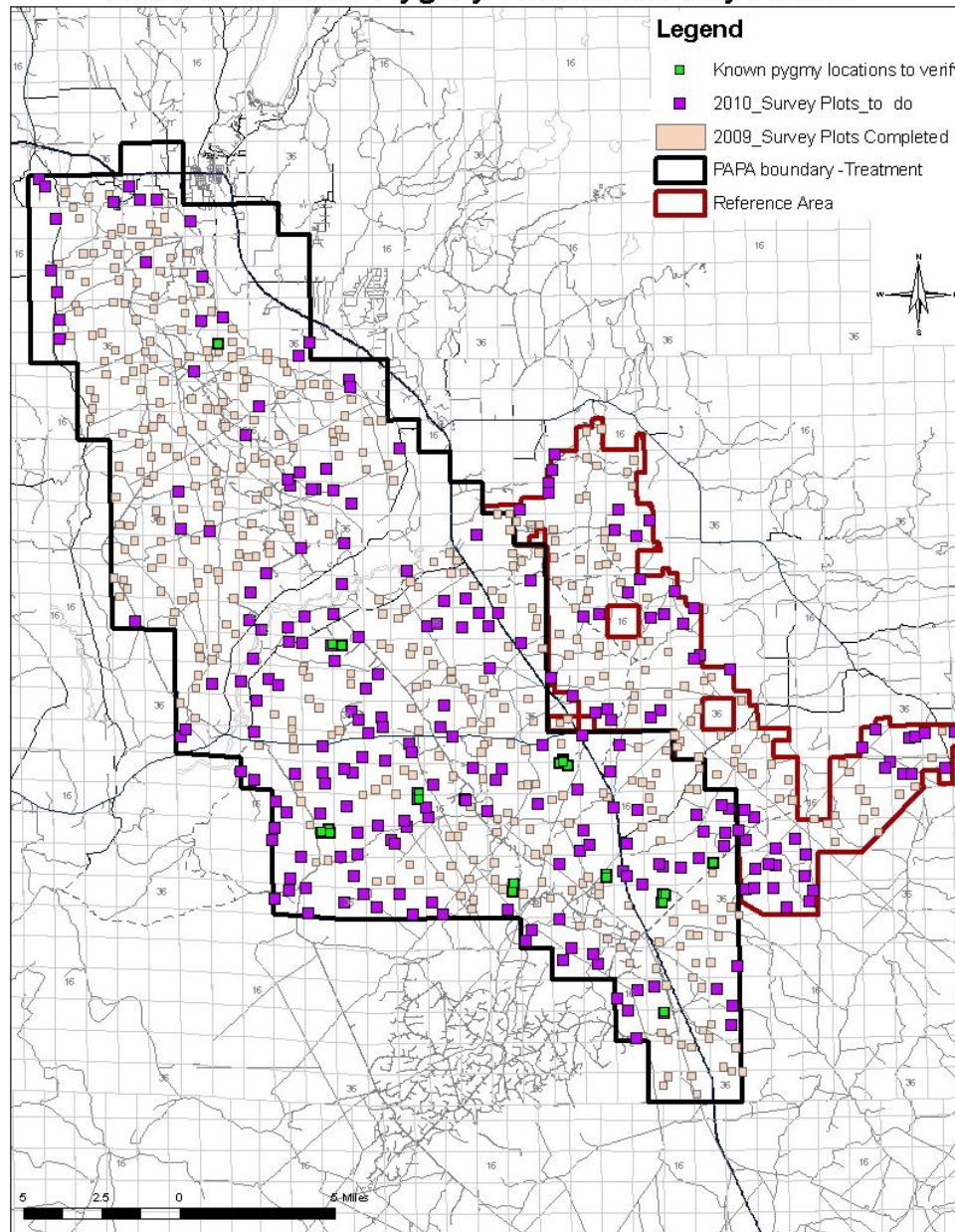


# Pygmy Rabbit Monitoring Objectives

- Identify and map suitable pygmy rabbit habitat
- Conduct monitoring sufficient to identify three consecutive years of decline in presence or absence of pygmy rabbit populations or decline in numbers of individuals each year over three years



## 2009 and 2010 Pygmy Rabbit Survey Areas



# Pygmy Rabbit Monitoring Costs

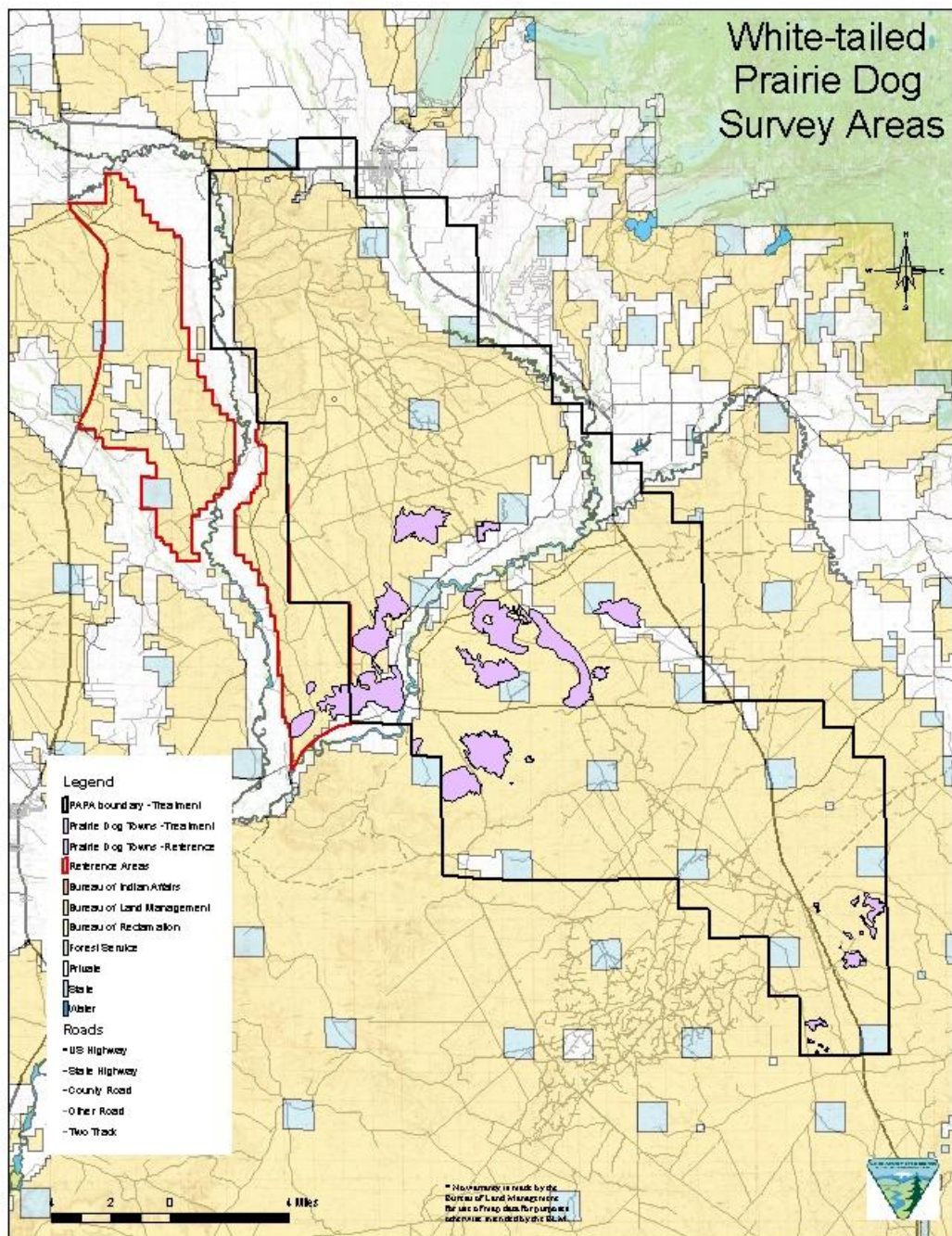
YEAR	ANNUAL MONITORING COSTS
2009	\$76,747
2010	\$170,000
2011	\$256,499



# White-tailed Prairie Dog Monitoring Objectives

- Map prairie dog towns within the PAPA and Reference areas
- Monitor long-term trend in occupancy rates
- Monitor long-term trend in active burrow density/prairie-dog numbers





# Prairie Dog Monitoring Costs

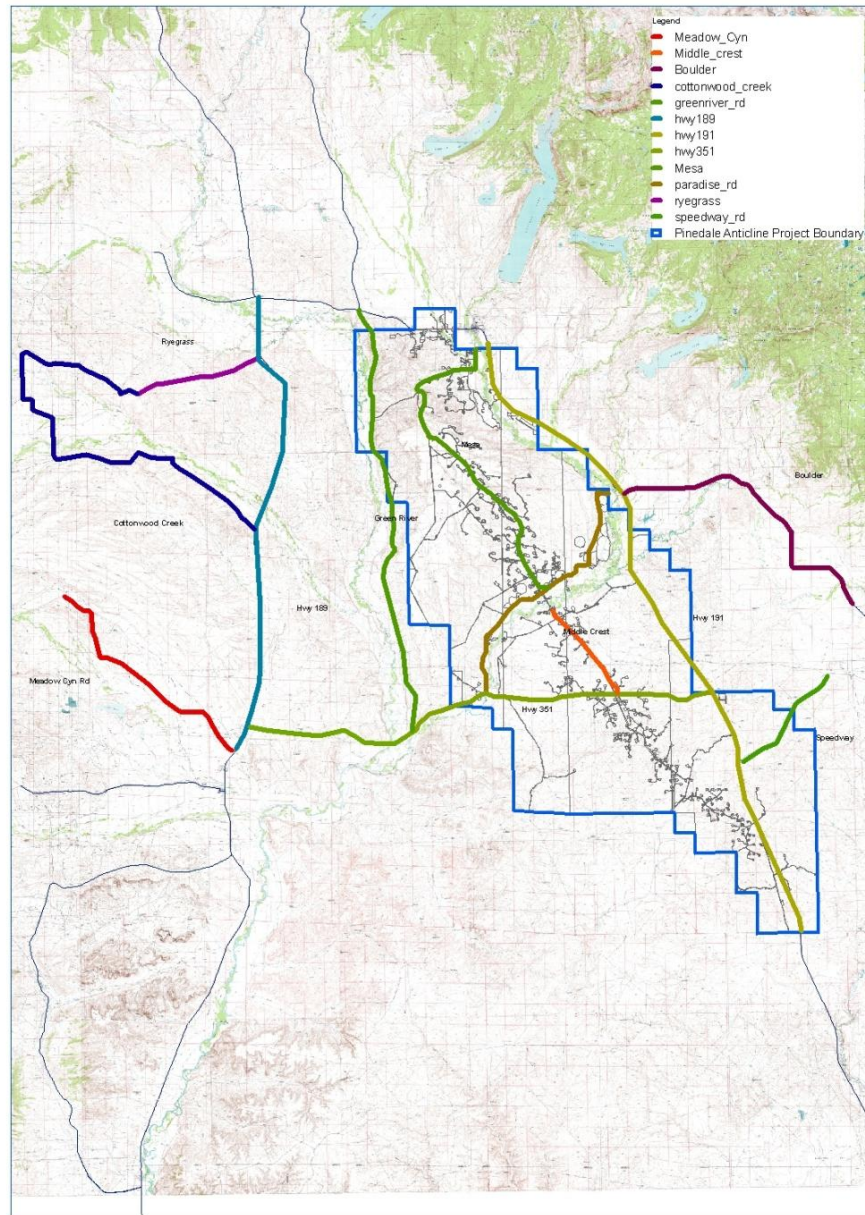
YEAR	ANNUAL MONITORING COSTS
2009	\$95,362
2010	\$65,000
2011	\$65,263



# Snow/Traffic Monitoring Objectives

- Monitor traffic volumes within the PAPA development area.
- Sample snow depths at fixed locations throughout winter months (November – April) within the PAPA and associated reference areas
- Report data in GIS format to be utilized in other PAPA Monitoring and Mitigation Matrix wildlife analysis.



Traffic and Snow Monitoring Routes  
Project Area

# Snow/Traffic Monitoring Costs

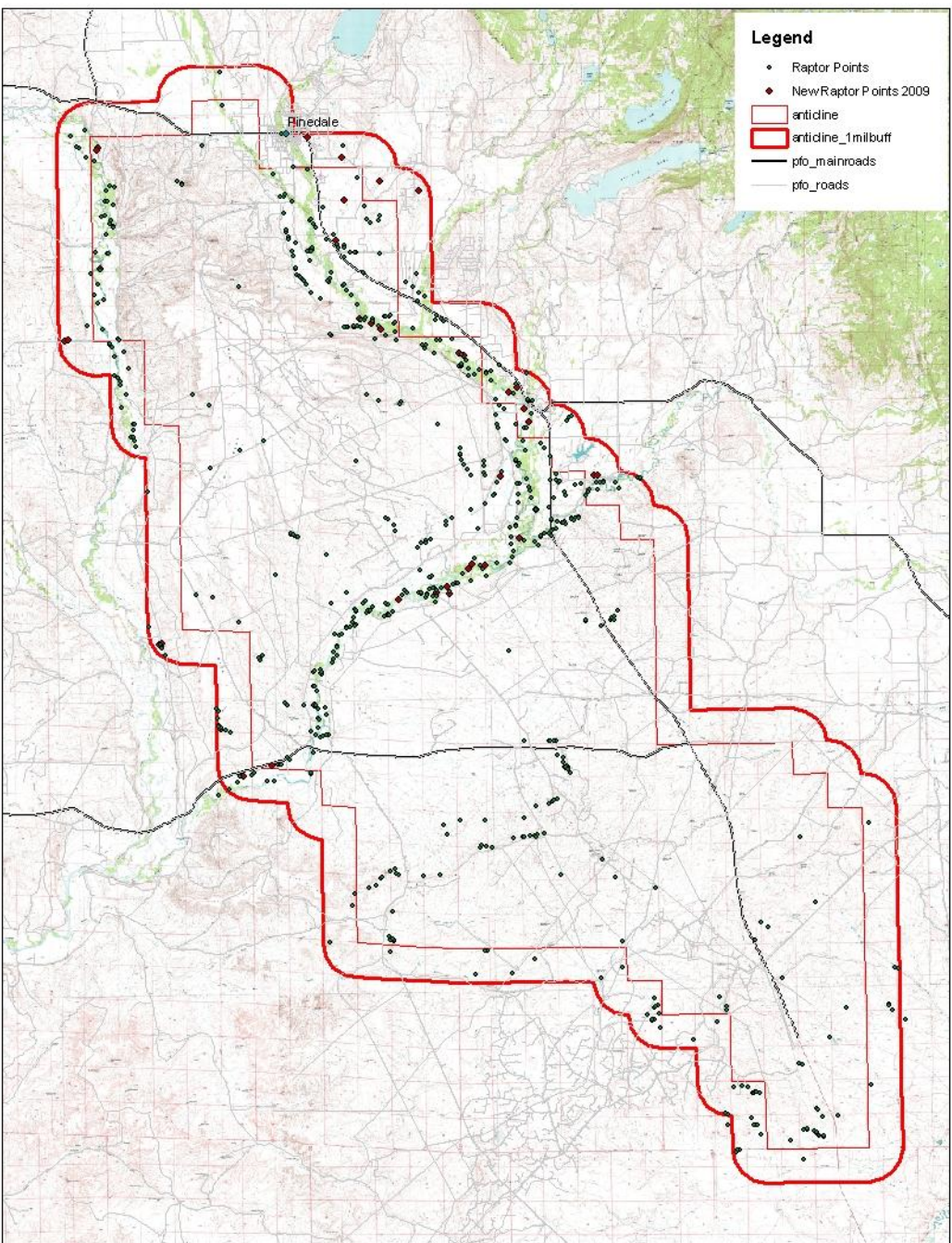
YEAR	ANNUAL MONITORING COSTS
2009	\$35,000
2010	\$25,200
2011	pending



# Raptor Monitoring Objectives

- Monitor all raptor nests within the PAPA and a 1 mile buffer to determine productivity
- Monitor New Fork and Green River Corridors within the PAPA to determine occurrence or potential occurrence of wintering bald eagle roosts





# Raptor Monitoring Costs

YEAR	ANNUAL MONITORING COSTS
2009	\$48,858
2010	\$120,000
2011	\$126,066



# FOCUS AREA DISCUSSION

## Wildlife Monitoring Mitigation

### Matrix Appendix B

Mark Thonhoff,  
Wildlife Biologist  
Pinedale Field Office,  
BLM



# Wildlife Monitoring Mitigation Matrix Appendix B

- The Matrix defines the parameters and thresholds for which monitoring is conducted on the five designated key species (mule deer, pronghorn, sage-grouse, pygmy rabbit, white-tailed prairie dog).
- The mitigation process utilizes performance-based measures to proactively react to emerging undesired changes, specifically declines in populations
- Adaptive management changes to the Matrix were made in 2010 based on the WY COOP review.



# Wildlife Monitoring Mitigation Matrix Appendix B

## University of Wyoming Fish & Wildlife COOP Unit Coordinated Third Party Review

- Initiation based on public comment
- Consisted of a panel of research biologist with extensive research experience
- Panel provided a thorough review of the PAPA monitoring plan
- BLM with recommendations from WGF made changes to the Matrix based on panel findings through Adaptive Management process
- Results found on the PAPA website :  
<http://www.wy.blm.gov/jio-papo/papo/wildlife.htm>



# Wildlife Monitoring Mitigation Matrix Appendix B

Species	Criteria	Method	Changes that Will Be Monitored	Specific Change Requiring Mitigation	Mitigation Responses
Mule Deer	Change in Mesa deer numbers	Current mule deer study, and use of WGFD data	Change in deer numbers in any year, or a cumulative change over all years, initially compared to average of 05/06 numbers (2856 deer)	15% decline in any year, or cumulatively over all years, compared to reference area (Sublette mule deer herd unit [average 05/06 herd unit population is 27,254], or other mutually agreeable area).	Select mitigation response sequentially as listed below, implement most useful and feasible and monitor results over sufficiently adequate time for the level of impact described by current monitoring.
	Avoidance distances		Average of any 2-year avoidance distance from well pads and roads, and a concurrent change in deer numbers compared to average of 05/06 numbers (2856 deer)	Average of 0.5 km change per year over 2 years, and a concurrent 15% decline in deer numbers in any year, compared to reference area (Sublette mule deer herd unit [average 05/06 herd unit population is 27,254], or other mutually agreeable area).	Select mitigation response sequentially as listed below, implement most useful and feasible and monitor results over sufficiently adequate time for the level of impact described by current monitoring.

Avoidance Distance removed 2010 following Univ. Wy. COOP review




# Wildlife Monitoring Mitigation Matrix Appendix B

Antelope	Change in Anticline antelope numbers	Present WCS antelope study; Present TRC project; and use of WGFD data	Change in antelope numbers in any year, or a cumulative change over all years, initially compared to first year of available antelope data	15% decline in any year, or cumulatively over all years, compared to reference area (Sublette antelope herd unit or other, mutually agreeable area)	Select mitigation response sequentially as listed below, implement most useful and feasible and monitor results over sufficiently adequate time for the level of impact described by current monitoring.
	Size of habitat fragments used		Use by antelope in any year, initially compared to first year of available antelope habitat use data, and a concurrent change in antelope numbers compared to first year of available antelope data	10% decline in habitat availability for one year, and a concurrent 15% change in antelope numbers for that year, compared to reference area (Sublette antelope herd unit or other mutually agreeable area).	Select mitigation response sequentially as listed below, implement most useful and feasible and monitor results over sufficiently adequate time for the level of impact described by current monitoring.

Fragmentation  
Parameter removed  
2010 following Univ.  
Wyoming Coop  
Review



# Wildlife Monitoring Mitigation Matrix Appendix B

Sage Grouse	Number of active leks in identified lek complexes	Lek counts according to protocol	Active use on 70% of total current leks; Active use on 70% of leks in each complex (the development area complexes include the Mesa, Duke's Triangle, and Yellow Point complexes) compared to 2007 data	30% decline in total number of active leks, or 30% decline in the number of leks in a single complex <sup>1</sup>	Select mitigation response sequentially as listed below, implement most useful and feasible and monitor results over sufficiently adequate time for the level of impact described by current monitoring.
Sage Grouse (cont.)	Peak numbers of males attending lek complexes <sup>1</sup>	Lek counts according to protocol	Total average 2-year change in numbers of males attending development area lek complexes (the Mesa, Duke's Triangle, or Yellow Point lek complex), compared to the East Fork, Speedway, or Ryegrass reference lek complexes	Average of 30% decline in numbers over 2 years compared to reference area <sup>1</sup>	Select mitigation response sequentially as listed below, implement most useful and feasible and monitor results over sufficiently adequate time for the level of impact described by current monitoring.
	 Nesting success and habitat selection	Current sage grouse study, WSGD data	Change in nesting success compared to reference areas, or change in nesting success and a concurrent change in habitat selection by nesting hens in relation to development disturbance	Average of 15% per year decline over 2 years in nesting success compared to reference area, or a 0.5 km increase in avoidance distance per year over 2 consecutive years and a concurrent change of an average of 15% per year decline over 2 years in nesting success compared to reference area	Removed in 2010 following Univ. Wyoming Coop Review
	Winter concentration area use	Monitoring according to protocol	Change in winter concentration area use compared to reference area (once initial data is available), and a concurrent change in the total average 2 year numbers of males attending development area lek complexes (the Mesa, Duke's Triangle or Yellow Point lek complex), compared to the East Fork, Speedway, or Ryegrass reference lek complexes	Average of 15% per year decline in amount of winter habitat used over 2 years compared to reference areas and a concurrent average of 30% decline in numbers over 2 years compared to reference area	Select mitigation response sequentially as listed below, implement most useful and feasible and monitor results over sufficiently adequate time for the level of impact described by current monitoring.
Sage Grouse (cont.)	Noise levels	Decibel monitoring from March 1-May 15 at lek sites	Noise levels demonstrated to impact peak lek use by male sage grouse and a concurrent change in the total average 2-year numbers of males attending development area lek complexes (the Mesa, Duke's Triangle, or Yellow Point lek complex), compared to the East Fork, Speedway, or Ryegrass reference lek complexes	Decibel levels at the lek more than 10 dBA above background measured from the edge of the lek (2000 ROD, p.27), and a concurrent average of 30% decline in peak numbers of male birds over 2 years vs. reference area.	Select mitigation response sequentially as listed below, implement most useful and feasible and monitor results over sufficiently adequate time for the level of impact described by current monitoring.



# Wildlife Monitoring Mitigation Matrix Appendix B

Sensitive Species <sup>2</sup>	Occurrence of species and change in numbers of each species	TRC data, existing and continued	3-year change in presence/absence of species, and in numbers of individuals of each species, compared to reference areas.	3 consecutive years of decline in presence or absence of a species, or an average of 15% decline in numbers of individuals each year over 3 years.	Select mitigation response sequentially as listed below, implement most useful and feasible and monitor results over sufficiently adequate time for the level of impact described by current monitoring.
--------------------------------	---	----------------------------------	---	--	--

## 2 Pygmy Rabbits and White-Tailed Prairie Dog



# Wildlife Monitoring Mitigation Matrix Appendix B

## When the Matrix is Triggered (Section B.2)

### 1/2. On-site

1. Protection of flank areas from disturbance (e.g., voluntary lease suspensions, lease buyouts, voluntary limits on area of delineation/development drilling) to assure continued habitat function of flank areas, and to provide areas for enhancement of habitat function.
2. Habitat enhancements of SEIS are (both core/crest and flanks) at an appropriate (initially 3:1) enhancement-to-disturbance acreage ratio.



# Wildlife Monitoring Mitigation Matrix Appendix B

## When the Matrix is Triggered (Section B.2)

### 3. On-site/off-site

1. Conservation Easements or property rights acquisitions to assure their continued habitat function, or provide an area for enhanced habitat function (e.g., maintenance of corridor and bottleneck passages, protection from development, establishment of forage reserves, habitat enhancements at an appropriate (initially 3:1) enhancement-to-disturbance acreage ratio).



# Wildlife Monitoring Mitigation Matrix Appendix B

## When the Matrix is Triggered (Section B.2)

### 4. Modification of Operations

1. Recommend, for consideration by Operators and BLM, adjustments of spatial arrangement and/or pace of ongoing development.



# Wildlife Monitoring Mitigation Matrix Appendix B

- It will be several years before modification of operations as noted in Mitigation Response 4 will be considered.
- Priority for mitigation will be given to those habitats designated as most crucial or important.



# Wildlife Monitoring Mitigation

## Matrix Appendix B

### **When the Matrix is Triggered: (section B.2)**

- Mitigation process utilizes performance-based measures to proactively react to emerging undesired changes early enough to assure both effective mitigation responses and a fluid pace of development over the life of the project.
- Initial mitigation will utilize responses 1, 2, and 3.
- Certainty of adequate results will be through implementation of a mitigation response followed by monitoring and if results are not satisfactory repeating the process until desired result or exhaustion of responses.
- Multiple mitigation attempts, with monitoring, is required.



# FOCUS AREA DISCUSSION

## Reclamation Plan Appendix C

Therese Hartman  
Wildlife Biologist  
Wyoming Game and Fish  
Department  
JIO/PAPO Interagency Team



# Reclamation Plan Appendix C

Operators are responsible for satisfactory and timely reclamation of the land surface disturbed by their operations (C-1, paragraph 1)

Reclamation standards established in “The Gold Book,” and specific criteria identified in the ROD (C-1, paragraph 2)

## Three types of Reclamation

- Site Stabilization
- Interim
- Full Site Final



# Reclamation Plan Appendix C

## Site Stabilization

- Not actively drilling, but plan to reoccupy within 2 years

## Interim Reclamation

- Locations where surface disturbing activities are not anticipated for the next 2 plus years, can include locations where all development is complete for the production phase of the pad

## Full Site Final Reclamation

- The production phase is complete, and all infrastructure have been removed. Applies to well pads, and the associated ROWs, etc.



# Reclamation Plan Appendix C

## Site Stabilization

Appendix A pg. A-10

- 75% protective cover
  - Organic mulch, herbaceous vegetation, jute matting, or other
- Modify all existing pads to approach zero sediment discharge
- Same standards for access roads

## Interim Reclamation Objective

- Achieve healthy, biologically active topsoil
- Control erosion
- Restore habitat, visual, and forage function (C-1, C.1, paragraph 1)



# Reclamation Plan Appendix C

## Interim Reclamation Considered Successful

Areas not needed for long-term production operations/vehicle travel are:

- Recontoured
- Protected from erosion
- Revegetated with a plant community that
  - Self-sustaining
  - Vigorous
  - Diverse (C-1, C.1, paragraph 2)



# Reclamation Plan Appendix C

## Interim Reclamation Vegetative Criteria

- Native Forbs
  - i. **Frequency** a minimum of 75%
  - ii. Diversity  $\geq$  the reference site
- Native Shrubs
  - i. **Frequency** a minimum of 50% (shrubs & half shrubs)
  - ii. At least 15% of the **frequency** must be the dominant species
  - iii. Diversity must be  $\geq$  the reference site



# Reclamation Plan Appendix C

## Interim Reclamation Vegetative Criteria cont.

- Native Grasses
  - i. Minimum of 3 native perennial species, 2 must be bunch grasses
  - ii. Achieve abundance and diversity similar to the reference site
- Non-native Weeds
  - i. Absent of noxious weeds (federal, state, and county)
  - ii. Other undesirables treated (e.g., cheatgrass)
- Plant Vigor (c-3, c.4, C.4.1, 1 – 5)



# Reclamation Plan Appendix C

BLM

Pinedale Field Office

## Full Site Final Reclamation Objective

- Achieve habitat, forage, and hydrologic functions
- Restoration of the landform
- Restore:
  - Natural vegetative community
  - Hydrologic systems
  - Visual resources
  - Agricultural values
  - Wildlife habitats (C-1, C.1, paragraph 3)



# Reclamation Plan Appendix C

## Full Site Final Reclamation considered successful when:

- Landform is restored
- Self-sustaining, vigorous, diverse, plant community with **frequency** to control erosion, non-native plants, & reestablish wildlife habitat and forage production
- Productivity  $\geq$  to pre-disturbance
- Resilient plants (i.e., influences removed  $\geq$  1 year)
- Well established shrubs
- Agricultural systems reestablished
- Natural water flow patterns (i.e., erosion control)
- Free of noxious or invasive species, etc. (C-1, C.1, paragraph 6)



# Reclamation Plan Appendix C

## Full Site Final Reclamation Vegetative Criteria

- Native Forbs
  - i. **Frequency**  $\geq$  the reference site
  - ii. Diversity  $\geq$  the reference site within 8 years
- Native Shrubs
  - i. **Frequency**  $\geq$  80% of the reference site
  - ii.  $\geq$  25% **frequency** must be the dominant species
  - iii. Diversity  $\geq$  than the reference site



# Reclamation Plan Appendix C

## Full Site Final Reclamation Vegetative Criteria con't

- Native Grasses
  - i. Production  $\geq$  reference site
  - ii.  $\geq 3$  native perennial species, 2 must be bunch grasses
- Non-native Weeds
  - i. Absent of noxious weeds (federal, state, and county)
  - ii. Other undesirables treated (e.g., cheatgrass)
- Plant Vigor (C-4, C.4.2, 2., a – e)



# Reclamation Plan Appendix C

- Reclamation and monitoring plan within 1 year (i.e., PAPA Monitoring for Reclamation Success) (C-2, C.2, paragraph 1)
- Site specific reclamation plans with APDs, PODs, [or Sundry notices] (C-2, C.2, paragraph 2)



# Reclamation Plan Appendix C

## Adaptive Management, 2010

- Operators will provide Annual Reclamation Monitoring Report (PAPO)
  - Status of all locations through qualitative and/or quantitative assessments per the *Pinedale Anticline Project Area Monitoring for Reclamation Success* document



# Reclamation Plan Appendix C

## Adaptive Management, 2010 con't

- Annual Reclamation Monitoring Report Summary (BLM)
  - Type of reclamation (e.g., interim)
  - Proposed reclamation in the upcoming planning year (including site stabilization)
  - Pads identified for future development that may be in interim reclamation
  - Trends and/or issues w/reclamation and/or issues with reclamation or the monitoring plan ...



# CLARIFICATIONS ?



# Adaptive Management Appendix E

Shane DeForest, Field Manager  
Pinedale Field Office  
Bureau of Land Management



# Adaptive Management Appendix E

- Uncertainties about how natural systems will react to human interventions
- Imperative that as much natural gas as possible be recovered from the PAPA
- Continue to strive to develop and use technologies to lessen impacts
- Uncertainties require a number of assumptions be used to predict the impacts
- Those predictions may or may not be partially or wholly correct.
- A significant off-site mitigation program will be necessary



# Adaptive Management Appendix E

- The adaptive management process allows for changes in the management without further NEPA analysis, unless designated thresholds are reached.
- The speed of management response is increased.
- Steps are: implement decision, monitor impacts, evaluate data, develop modified mitigation or management recommendations, make adaptive management decision, repeat.



# Adaptive Management Appendix E

## Goals and Objectives for Adaptive Management

- Determine the effects of PAPA development on area resources
- Determine the effectiveness of the mitigation measures contained in this ROD.
- Suggest modification to mitigation measures to achieve the stated goals/objectives
- Assure oil and gas related BLM decisions regarding the PAPA are coordinated with non-oil-and-gas-related decisions
- Provide a rapid response to unnecessary and undue environmental degradation, should any occur
- Validate predictive models used in the SEIS and revise the models/projections as necessary based on field observations and monitoring



# Adaptive Management Decision Process

## Page 18 ROD:

- Based on annual planning meetings
- Utilize “Review Team” (BLM and other federal, state, and local agencies)
- Utilize the PAWG as an advisory group
- Decision of the Authorized Officer Completes the Process



# Adaptive Management Decision Process

- Identification of an adaptive management opportunity/need is submitted
- AO evaluates merit and urgency of need
- Convenes review team (charter to make a recommendation)
  - Need
  - Urgency
  - Additional NEPA needed
- AO compiles recommendations and coordinates with public and PAWG
- Considering the public comments, AO prepares decision



# PAPA SEIS AIR PROGRAM



Merry E. Gamper,  
Physical Scientist  
Wyoming State  
Office, BLM



# Air: Legal Background

- Legal requirements include the NAAQS and WAAQS, which set maximum limits for several air pollutants, and PSD increments, which limit the incremental increase of certain air pollutants (including NO<sub>2</sub>, PM<sub>10</sub>, and SO<sub>2</sub>) above legally defined baseline concentration levels. These standards and increments are presented in Table 3.11-1 in Chapter 3.
- Where legal limits have not been established, the BLM uses best available scientific information to identify thresholds of significant adverse impacts. Thresholds or levels of concern are identified for HAP exposure, incremental cancer risks, a “just noticeable change” in potential visibility impacts, and potential atmospheric deposition impacts.



# Air: Ozone Modeling

- The Draft SEIS (BLM, 2006a) included an ozone modeling analysis that utilized the CALGRID model to estimate ozone formation from project sources. The Revised Draft SEIS used the CAMx modeling system.
- 2002 base case (WRAP)
- 85 ppb standard
- Annualized data
- Determination of summer ozone impacts
- Proposed action model alternative and alternative C w/phase 2 mitigation model alternative



# Air: Modeling Basics

- Near-field, far-field, mid-field
- 2005 base case
- No action, proposed action, alternative C phase 1, alternative C phase 2 model scenarios
- Full production 2026
- Total of eleven different modeling scenarios
- Deposition and sensitive lakes
- Visibility



# Air: Model Assumptions

Table 2.4-12, page 2-35 RDSEIS

## Estimated Wells, New Well Pads, and Drilling Rigs by Year for Alternatives B, C and D

Year	Wells	New Well Pads	Drilling Rigs
2007	268	44	35
2008	299	36	45
<b>2009</b>	<b>305</b>	<b>37</b>	<b>48</b>
2010	291	29	45
2011	290	33	45
2012	289	13	45
2013	288	15	45
2014	287	11	45
2015	287	12	45
2016	286	12	45
2017	282	8	44
2018	279	0	43
2019	213	0	35
2020	187	0	28
2021	177	0	26
2022	143	0	21
2023	112	0	19
2024	107	0	16
2025	9	0	3

**Total 4,399**



# Air Quality ROD Commitments

## ROD requirement #1:

Reduce to 2005 emission levels to achieve 40 days of visibility impairment.

Table 4.1, page 37 of the AQ TSD\* reports 2005 emissions levels as:

Emissions	Phase 1 Mitigation [tons per year]
NO <sub>x</sub>	3809.3
SO <sub>2</sub>	233.7
PM <sub>10</sub>	872.5
PM <sub>2.5</sub>	295.7

\*Air Quality impact analysis Technical Support Document



# Air Quality ROD Commitments

Based on a review by WDEQ , the 2008 and 2009 emission levels were deemed to be in compliance with the 2005 emission reduction requirement:

	NO <sub>x</sub>	Phase I Mitigation
Field Compression, 2008 Actual	441.6	379.7
Granger Gas Plant, 2008 Actual	238.5	301.7
Drilling Rigs		2632.2
2008 Actual (Anschutz, Yates & Newfield)	39.35	
2009 Projected Actual (Ultra, Shell & Questar)	1024.3	
Production Sources, 2008 Actual	1279.42	495.7
<b>Total</b>	<b>3023.17</b>	<b>3809.3</b>



# 2009 Emission Levels

- Emission levels are tracked by DEQ and are legally responsible for ensuring compliance with the Clean Air Act
- BLM is responsible for ensuring compliance with ROD and that impacts remain within what was analyzed.
  - 2010 Emission Inventories have been submitted but have not yet been released by DEQ
  - Emission inventories are not necessarily broken out by field or by EIS



	A	B	C	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
1	2009 Emissions Inventory as submitted to DEQ***				PFO Federal Wells**03/2011														
2	Company	Field	NOx	VOC	PGW	POW	SI	DRG	AAPD	NOx/tpg/ well	VOC/tpg/ well								
3	Anschutz	Anticline	4.12	11.09	6	0	0	0	4	0.63	1.85								
4	Newfield	Anticline	26.77	147.88	31	0	0	1	11	0.86	4.77								
5	QEP/Wexpro	Anticline	744.9	1399.49	542	2	3	96	99	1.37	2.58								
6	Shell	Anticline	484.42	541.63	364	0	10	87	91	1.33	1.49								
7	Ultra	Anticline	1042.23	1046.2	668	0	2	175	338	1.56	1.57								
8	Yates	Anticline	12.89	153.75	5	0	0	1	2	2.58	30.75								
9			2315.61	3300.04	1616	2	15	360	545	5.82**	12.25**	2315.61	13276.1	1993		1.16187	6.66136		
10	BP	Jonah Infill	195.3	270.22	239	0	1	37	11	0.82	1.13								
11	Devon	Jonah Infill	21.51	20.86	14	0	0	0	4	1.54	1.49								
12	Encana**	Jonah Infill	425.7	1040.4	1133	0	11	53	40	0.38	0.92								
13	Omimex	Jonah Infill	4.07	40.09	8	0	0	0	0	0.51	5.01								
14	Ultra	Jonah Infill	42.44	153.27	69	0	0	0	9	0.62	2.22								
15	Yates	Jonah Infill	0.93	20.03	5	0	0	0	3	0.19	4.01								
16			689.95	1544.87	1460	0	12	90	67	4.04	14.78	689.95	1544.87	1562		0.44171	0.98903		
17	EnCana	Jonah II			17	0	3	0	2										
18	Yates	Jonah II			0	0	0	0	1										
19					17	0	3	0	2										
20	EOG	LaBarge	105	3528.1	681	307	43	3	66	0.15	5.18								
21	Exxon	LaBarge	75.79	1992.41	436	1	1	8	13	0.17	4.57								
22	Chevron	LaBarge	35.94	1119.86	174	106	5	1	3	0.21	6.44								
23	Nedale Investme	LaBarge	0?	0?	2	22	0	0	0	?									
24	Vector	LaBarge	?	?	6	1	0	0	1	?									
25	Wexpro/QEP	LaBarge	?	?	14	0	0	0	0	?									
26	Whiting*	LaBarge	17.67	416.98	1	0	0	0	6	?									
27			234.4	7057.35	1306	414	29	12	88	0.53	16.19	234.4	7057.35	1761		0.13311	4.00758		
28	Black Diamond	RMP	0.99	3.87	11	3	2	0	1	0.09	0.35								
29	Conoco	RMP	6.8	48.76	0	0	0	0	0	?	?								
30	Gasco	RMP	0.43	4.83	0	0	1	0	0	?	?								
31	Williams*	LaBarge	55.41	1297.4	436	0	0	0	0	0.13	2.98								
32	Cimarex	Rands Butte	19.29	22.85	1	0	5	1	?	19.29	22.85								
33			82.92	1377.71	450	3	8	1	1	19.6	26.18	82.92	1377.71	462		0.17948	2.98206		
34	Inventory as sub		Total NOx	Total VOC	Total PGW	Total POW	Total SI	Total DRG	Total Potential to emit	Total AAPD	Total NOx/gas well	Average NOx/ gas field	TotalVOC/ gas well	Average VOC/ gas well	Average NOx/total PE	Average VOC/total PE	Average NOx/ Operator	Average VOC/ Operator	
36	total anticline		2315.33	3300.04	1616	2	15	360	1993	545	1.43	5.82	12.26	2.04	1.16	6.66	1.16	2.45	
37	total jonah		689.95	1544.87	1460	0	12	90	1562	67	0.47	4.04	14.78	1.06	0.44	0.99	0.67	2.46	
38	total labarge		241.2	7106.11	1306	414	29	12	1761	88	0.18	0.53	16.19	5.44	0.13	4.01	0.18	5.4	

# AQ Emissions ROD Commitments cont.

- Currently in discussions with Operators regarding the 80% emissions reduction required no later than 3/12/2012.
- Also, beginning discussions with Operators regarding the 0 days of visibility impairment requirement. Modeling is required to evaluate potential reduction scenario's. Modeling scenarios and protocol for evaluation must be approved by BLM and WDEQ in consultation with EPA.



# Ozone Modeling

- Discussions began with DEQ and EPA immediately following the signing of the SEIS ROD
- While the intent was to have an ozone model capable of reproducing winter ozone formation, this has not come to fruition
- Purpose of the remodel is to address lower ozone standard that was promulgated during revision of the SEIS.
- BLM initially identified 2006 as a base year and a protocol was written. Model scenario development was occurring when the project was delayed.
  - A New ozone standard was proposed, delayed, proposed...
  - WSO BLM AQ specialist working this project left the BLM. A new hire was brought on.



# Ozone Modeling cont.

- Project regained speed in 2010
  - Changed from a 2006 base year to a 2008 base year
  - 2008 provides consistency with other modeling actions in the state (model platform and base year)
  - More complete inventory and monitoring data than for 2006
  - Updated meteorological package (WRF) is available
- Protocol is being revised.
- Sensitivity analysis scenario's have been identified.
  - Is ozone formation NOx or VOC limited?
- Identify any additional measures that are necessary.



# PAPA SEIS

## Groundwater Monitoring Program



Merry E. Gamper,  
Physical Scientist  
Wyoming State Office,  
BLM



# Groundwater Resources

## Background

- 2000 PAPA ROD
  - Dynamac Report 2002
  - Cementing to surface if within 500' of stock or domestic well
  - Monitoring: "All water wells within one mile of producing or proposed gas wells"
- SCCD contracted by the Operators
- WRTG developed an SAP
  - Annually 10% of all wells to be sampled for Total Petroleum Hydrocarbons
- GW Sampling began in 2004



# Groundwater Cont.

- Low Level Detections 2006-present from primarily two sources: BLM ROD and DEQ sampling “sweep”
- LEL alarms
  - WOGCC “Yates” paper
- Conceptual Model/WRTG
- DRAFT SEIS
  - EPA EU-3 “Environmentally Unacceptable Rating”
    - Prohibition on new water wells
    - Backflow preventers
    - Groundwater/Aquifer Pollution Prevention, Monitoring and Mitigation Plan
  - Interim Plan within 3 months of ROD
  - Final Plan within 6 months of completing all Interim Plan worktasks



# Current Groundwater Monitoring

- Currently sampling over 300 wells
- TPH DRO/GRO on all wells instead of just 10% as originally required.
- If a positive sample result on DRO and/or GRO, resample for BTEX → “confirmation sample”.
- Refinement of required lab sample method → “sensitivity, accuracy, precision”.
- Sampling Method assessment.

Hydrocarbon Detections		Domestic	Stock	Ind/Misc
2006	Below	0	0	3
	Above	0	0	1
2007	Below	0	0	5
	Above	0	0	2
2008	Below	1	1	15
	Above	0	0	3
2009	Below	0	0	14
	Above	0	0	2
2010	Below	0	1	3
	Above	0	0	7



# SEIS Programmatic Mitigation

- Interim Groundwater/Aquifer Pollution Prevention, Monitoring and Mitigation Plan within 3 months of ROD signature.
  - BLM, DEQ, EPA
  - Completed on December, 2008
    - Requires a number of Plans of Study be developed and implemented
- Final Groundwater/Aquifer Pollution Prevention, Monitoring and Mitigation Plan within 6 months of Interim Plan work task completion.
  - BLM, DEQ, EPA, SEO, WOGCC
  - Expected completion date 11/2011



# Interim Plan: Plans of Study

- Data Gaps
  - Aquifer Characterization
  - Hydrostratigraphic Unit Definition and Communication
  - Surface/Groundwater Interaction
- Low Level Hydrocarbon Study
  - Source Assessment/Rainbow Matrix
  - Biogenic vs. Thermogenic Origin of Headspace Gas
- Standard Operating Procedures Evaluation
- Vulnerability/Risk Assessment
- Mitigation Identification

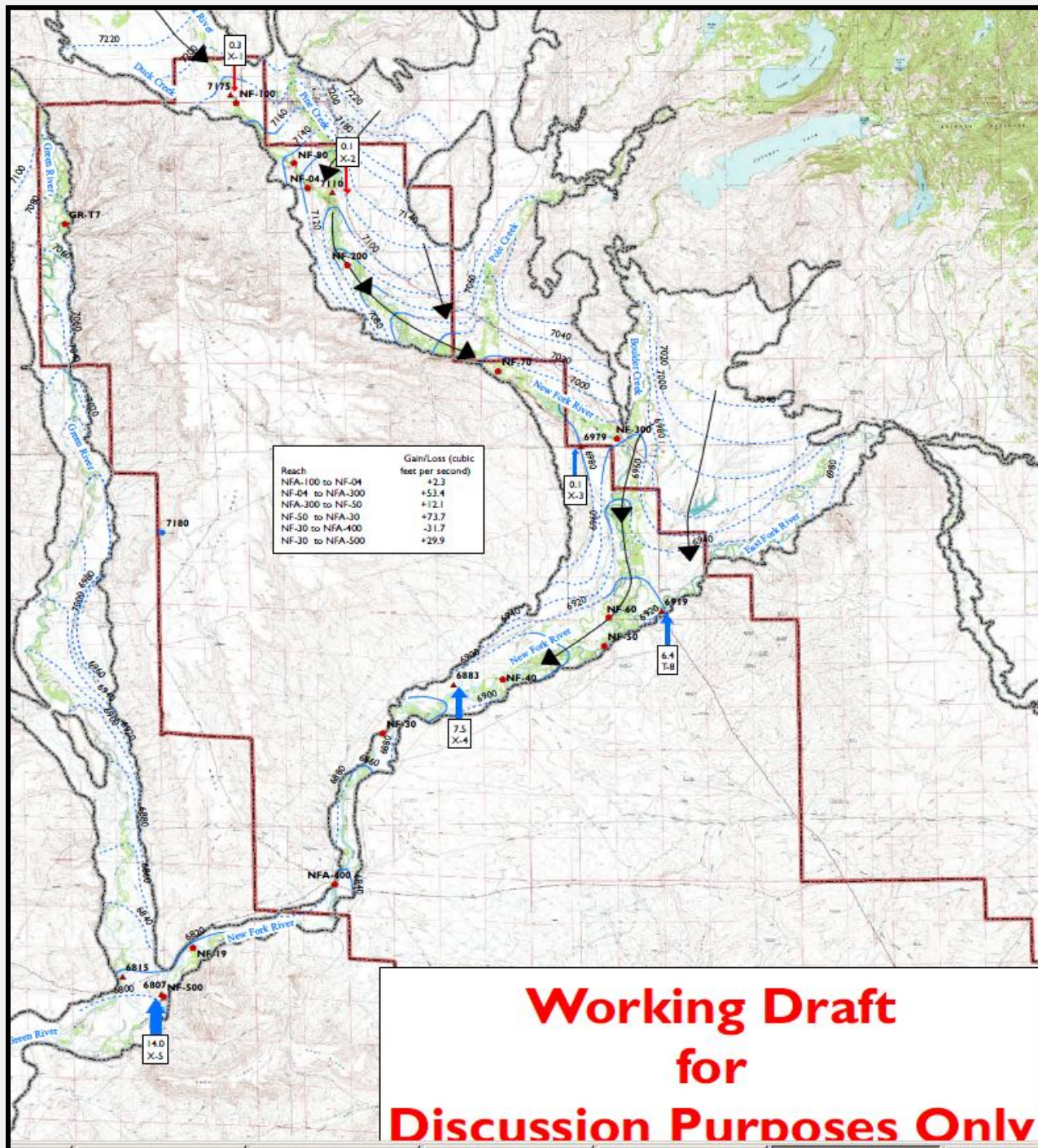


# Study Wells for Aquifer Characterization

- Network Assessment
- Credibility Determination
- Well Permitting and Installation
  - Combination of Private, State and BLM
  - 30 Piezometers
  - 30 Study Wells (30' to 800')
    - 4 on private land
    - 10 on native range
    - 16 on existing disturbance
  - Unable to secure permission for one site on Green River



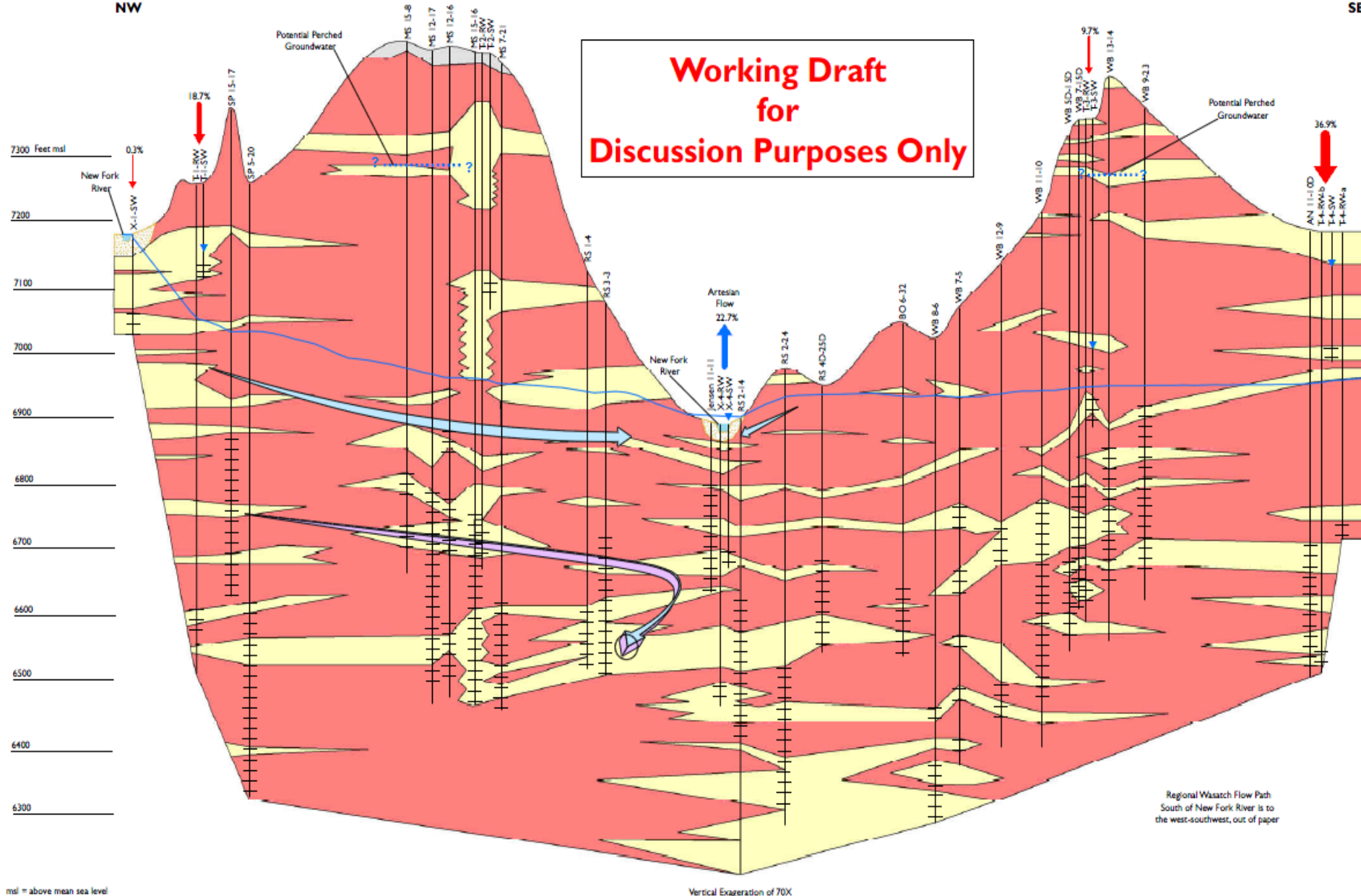




NW

SE

**Working Draft  
for  
Discussion Purposes Only**



Feet 15,000

Geomatrix

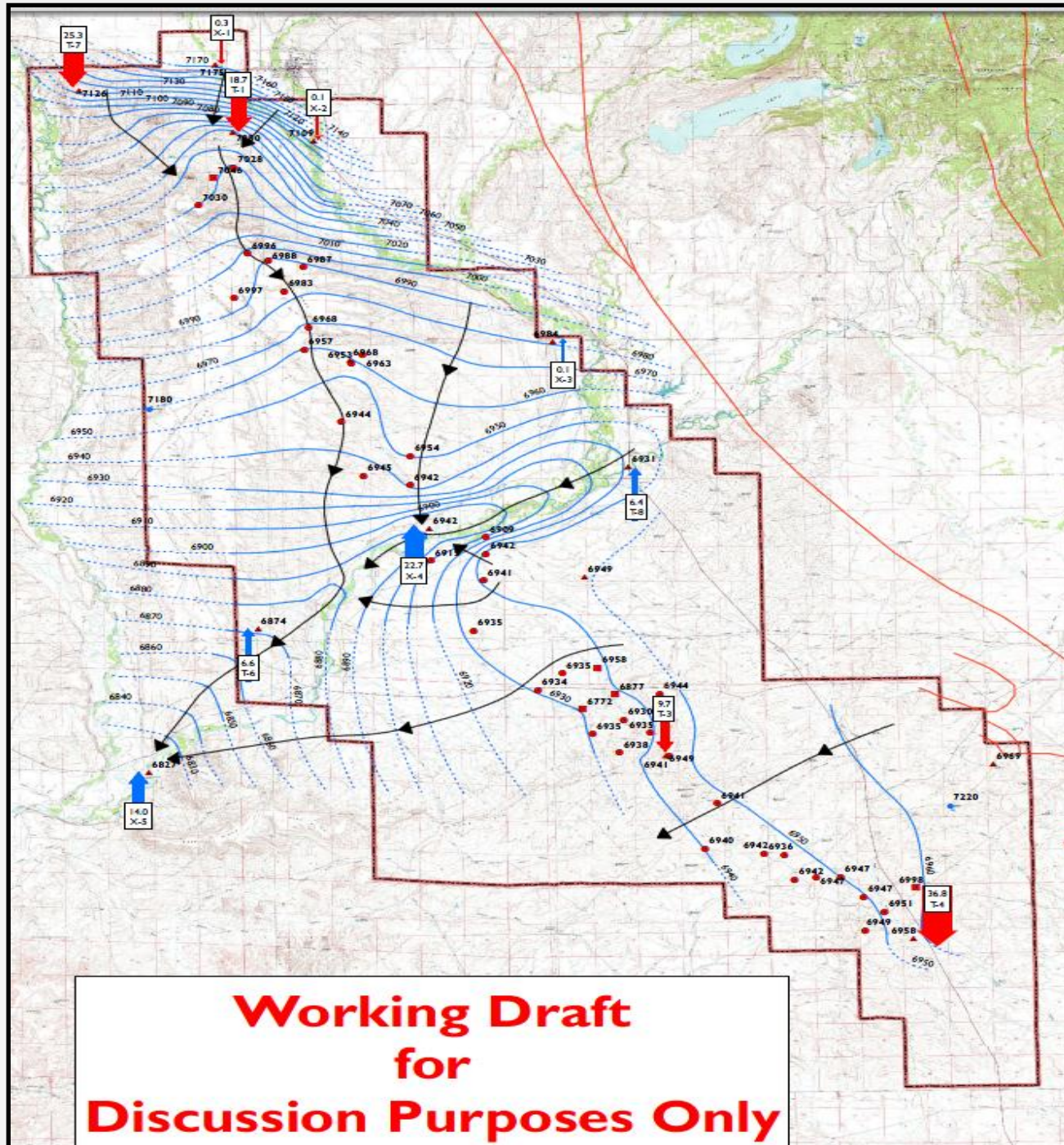
- ▼ Groundwater Elevation in Shallow Wasatch Well (Sept. 2010)
- Regional Wasatch Potentiometric Surface (Sept. 2010)
- Generalized Direction of Groundwater Flow

- ↑↓ Vertical Gradient (%) (Calculated between RW and SW or SW and A - Sept. 2010)
- Well and Perforated Zone (T- and X- = Study Wells, all other wells are Industrial Water Supply Wells)

#### Generalized Lithology

- Alluvium
- Gravel
- Sandstone
- Shale/Siltstone

Hydrogeologic Conceptual C  
PAP  
Sublette Coun



**Working Draft  
for  
Discussion Purposes Only**

# Final Groundwater/Aquifer Plan

- Numerical Model
  - Particle transport analysis and Sampling Network Design
- Sampling and Analysis Plan
  - How, where, when, what
  - Aquifer Health and Background Monitoring
  - Domestic well Monitoring
  - Triggers for action
  - Response plan
- Mitigation Measure Identification and Implementation
- Monitoring Program Implementation
  - Reporting
    - How, when, who



# Public Involvement with BLM

[www.blm.gov/wy/st/en.html](http://www.blm.gov/wy/st/en.html)

[www.blm.gov/wy/st/en/field\\_offices/Pinedale.html](http://www.blm.gov/wy/st/en/field_offices/Pinedale.html)

PAWG Meetings

JIO/PAPO Board Meetings

Scoping Meetings

Annual Planning Meetings

Topical Meetings

Field Tours

APD Posting Book

NEPA Register

Monthly Radio Talks on KPIN

Specialists and Managers

Wyoming Resource Advisory  
Council

Annual Report to the Public

E-News

Facebook, Twitter, YouTube

RSS Newsfeeds

## Other Resources

- Cooperating Agency Websites
- Local Newspapers and Websites



# CLARIFICATIONS ?

